The Effects of Program Attributes on Behavior Change for the Healthy Weight for Healthy Kids Program in Virginia

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Abstract

Since the federal budget for EFNEP is over $66 million, it is crucial to know the effectiveness of program attributes that may bolster its effectiveness. The aim of this study was to determine how effectiveness of Youth EFNEP programs in Virginia is affected by participant, instructional and curriculum attributes for youth enrolled in Healthy Weight for Healthy Kids (HWHK). An ordered probit model was employed to study how these attributes affect dependent variables: Whole Grain, Fruits, Colored Vegetables, MyPlate, and Breathe Hard behavioral scores. The model assessed the probability of a participant having an improved score or improved behavior.

Participant Attributes Results: In general, the chosen variables for participant characteristics consistently reduced the probability of participants having an improved behavior score.

Instructional Attributes Results: African Americans Program Assistants' were consistently associated with negative marginal effects on positive behavioral scores with the exception of the positive Breathe Hard behavioral score. Other PA attributes were not consistently associated with any behavioral models but were heterogeneous in terms of their marginal effects on the positive behavioral scores.

Curriculum Attributes results: The curriculum attributes had more positive marginal effects than negative marginal effects across all the five behavioral scores. Attributes that were consistently associated with having a positive marginal effect on behavioral scores were program duration, smart foods lesson, and lesson duration. Other HWHK lessons were not consistent in increasing or reducing the probability of an improved behavior.

DEDICATION

To my family, to my Grandfather Keitese Sooka Lefhoko

and

with remembrance of my grandmothers; Galetlhabe Lefhoko and Baibegi Busang.

ACKNOWLEDGEMENT

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Chapter 1.0

1.1 Introduction

The alarming increase in the number of overweight and obese children is perhaps one of the nation's greatest concerns since obesity has cost implications on the economy. The percentage of overweight children in America has tripled in the last 30yrs [1]. In 2010 about 40% of children were overweight and 20% of children were obese nationwide [2]. Several studies have shown that there is a positive correlation between wealth and obesity [3, 4]. The studies suggest that low income children are more prone to being overweight than children in wealthy families. Children in low income families are less likely to meet daily dietary recommendations and they have barriers to physical activities [5]. Moreover, other obstacles that limited resource families have to overcome include psychological factors [6]. For example, limited resource individuals have to make tradeoffs between economic and health decisions and a recent study have suggested that this tradeoff has a negative impact on cognitive control [7]. According to research, youth obesity also increases chances of cardiovascular disease, certain forms of cancer, high blood pressure, and other chronic diseases in later life which may end up being more costly to the economy [8]. It is no wonder that the federal government has introduced several initiatives to alleviate obesity problem across America's limited resource families [9-12].

One of the largest programs that are designed to address nutritional quality is the Expanded Food and Nutrition Education Program (EFNEP), which was introduced in 1969. Although the initial focus of EFNEP was primarily malnutrition targeting limited resource individuals, due to the projected rising trend on overweight and obese youth in the US, EFNEP

has tailored its efforts toward overweight and obesity prevention. EFNEP is implemented throughout 50 states in United States (US). The goal of EFNEP is to help limited resource people in "acquiring the knowledge, skills, attitudes, and changed behavior necessary for nutritionally sound diets, and to contribute to their personal development and the improvement of the total family diet and nutritional well-being" [13]. In 2011, United States Department of Agriculture (USDA) spent more than $67 million dollars on EFNEP [14]. Though much money has been spent, we know very little about how effective this money is in changing behavior, especially for youth.

1.2 Problem Statement

Several research studies have been done to assess the success of EFNEP [6, 11, 15-17] and most of these studies suggest that EFNEP program is both effective and beneficial to limited resource individuals. However, most of these evaluations have been done on adult EFNEP participants using cost benefit analysis, cost effectiveness analysis, and ANOVA methods to measure EFNEP effectiveness.

Despite extensive research on adult EFNEP, only one study was done on the factors that influence program effectiveness of youth EFNEP [17]. Thus, it is crucial to identify and understand socioeconomic factors, demographic attributes of both participants and program assistants (PA's), and other factors that may influence effectiveness of youth EFNEP. Additional analysis on EFNEP effectiveness will help administrators and policy makers on how to strategically implement more effective programs and curriculum.

Analysis on program effectiveness evaluates effects intended to elicit a desired outcome based on attributes of interest. In EFNEP, factors can change behavior with regards to increase

in physical activities, decrease in weight, and increase in positive nutritional behavior. Effectiveness analysis is measured by change in a targeted outcome.

The effectiveness of education programs in general can depend on numerous factors of the different levels in the organizational structure (see Appendix A), but the three main categories of factors are instructional attributes, curriculum attributes, and participants' attributes. Instructional attributes may include age, education level, gender, experience of instructor while youth participant attributes may include gender, ethnicity, and type of family that participants reside with. Examples of curriculum attributes are duration of program, lesson in minutes, topics or content covered in class. In Virginia, the curriculum used is called Healthy Weight for Healthy Kids or HWHK (see section 2.2.1.1).

Obesity prevention efforts have been shown to differ by program attributes in CBA studies [18, 19], and it is not known why there are differences. These differences may be due to management of the programs and participants' household type (i.e. number of parents in a family). Problems that can arise from these inexplicable differences include making decisions on whether to implement the most cost effective program as opposed to the most effective program. Identifying factors that change program effectiveness can also aid policy makers to make better decisions on allocation of resources.

1.3 Objectives

The main objectives of this study are to:

- Identify participant attributes that may enhance or reduce HWHK effectiveness on youth in Virginia.

- Identify Program Assistant attributes that may enhance or reduce HWHK effectiveness on youth in Virginia.

- Identify curriculum attributes that may enhance or reduce HWHK effectiveness on youth in Virginia.

1.4 Maintained Assumptions

- Data collected from surveys carried out in the EFNEP youth programs are not biased.

- Behavioral responses to survey items correlate highly with behavioral change

1.5 Hypothesis

H_0: Participant, Program Assistants, and Curriculum attributes have no effects on the behavioral scores collected from EFNEP youth enrolled in HWHK program in Virginia.

1.6 Conceptual Framework

This study is part of a larger study, based on surveys of participants of the youth EFNEP programs, as well as instructors in 19 counties in Virginia. However, this study only includes locations that implemented youth EFNEP during the fall of 2011. Best practices in youth nutrition and effectiveness were identified from previous studies. Data collected include program delivery attributes and participants' attributes from surveys of instructors and EFNEP participants in the locations. This study focus primarily on youth aged 7-14 years.

Effects: In identifying effects, a survey instrument was developed. Effects were measured by scores on answers to questions on behavior. However this process was challenging since it was difficult to identify evaluation instruments that, although are sensitive to age and culture, are also made to reflect the curriculum and are independent of the behavioral score [12, 20].

Voluntary consent form for human subjects was signed by participants and approved by Virginia Tech's Institutional Review Board (IRB). All Participants of the HWHK were administered pre and post surveys, using an instrument developed specifically for this study in Virginia.

In addition to effects, information was collected on participants and instructional attributes or program attributes such as participant's age, place of residence, education level and program attributes. Utilizing this data, an ordered probit model was developed and implemented to test if there are any factors that affect the behavior scores of Youth EFNEP based on the use of five selected instruments or items from the survey.

1.7 Technique

This study was based on both quantitative and qualitative design. Data were collected from 19 different EFNEP locations in Virginia who administered the Healthy Weights for Healthy Kids (HWHK) curriculum. From the survey, behavior items were selected, and the differences for pre-test and post-test were computed. A t-test was then used to evaluate whether the mean of the differences were significantly different from zero. Five items, with large mean differences that were significantly different from zero, were selected from the behavior topics and were used as metric to evaluate whether participant behavioral change was improved or not. These five items were whole grains, fresh fruit, colored vegetables, MyPlate and breathe hard. For differences less than zero (a decline in the behavioral score), a score of -1 was assigned while a score of 1 was assigned to differences greater than zero (an improvement in the behavioral score). These five items were then used as dependent variables in an ordered probit model with participant, program assistant, and curriculum attributes as explanatory variables. In addition the selected items were among the behavior questions with the largest

mean difference and also align with the US Dietary guidelines [21]. Research has linked diets high in whole grains, fruits and vegetables with lower risk of chronic diseases such as heart disease, diabetes, high blood pressure and some cancers [22-25]. In addition, fruits and vegetables can also be used for weight management since they are low in fat content, calories, cholesterol, and are satisfying [26, 27]. In order to know how much to eat, the USDA provides MyPlate serving recommendations with the goal of balancing calories and knowing what foods to increase or decrease. The software STATA™, version 11.2 was used for analysis.

1.8 Data Sources

Primary data for this study were collected by Researchers at the Agricultural and Applied Economics department and the department of Human Nutrition, Food, and Exercise at Virginia Tech.

1.9 Outline

The rest of the thesis will contain the following sections: Chapter 2 Background and literature review, Chapter 3 Instrument Development, Data Collection and Econometric Model, Chapter 4 Data and Summary Statistics, Chapter 5 Results and finally Chapter 7 Discussions, suggestions for future research and conclusions.

CHAPTER 2.0 Background and Literature Review

This chapter will be structured as follows. First a background on EFNEP will be detailed, followed by background on Adult EFNEP, and a literature review of Adult EFNEP. Then background on Youth EFNEP will be discussed followed by description of Healthy Weight for Healthy Kids. Finally, an overview of current literature on Youth EFNEP will be discussed.

2.1   Background on EFNEP

The Expanded Food and Nutrition Education Program(EFNEP), was established in 1969 by the United States Department of Agriculture(CSREES, USDA) [15]. EFNEP is the largest federally funded program targeting limited resource individuals and is designed to improve the quality of their diet, increase food savings and safety, while improving their nutrition practices and knowledge [17]. USDA spends approximately $66 million dollars a year nationally on EFNEP [6]. In terms of coverage, EFNEP is implemented throughout 50 States, six territories and more than 800 counties. Every year there are at least 500,000 new participants, which brings the total to at least 21 million participants since the program's inception.

EFNEP is taught by paraprofessionals, who are trained to teach the curriculum. These paraprofessionals include volunteers and school teachers who reside in the local community [6, 15, 28]. The program is delivered to two types of groups: adults and youth.

2.1.1 Background on Adult EFNEP

EFNEP was originally targeted to adults and families below the poverty threshold in 1969 when it was introduced. The paraprofessionals initially delivered the program on a one on one basis. Later on in the early 1980s, the group format was introduced to alleviate costs

associated with individual contact [28]. This prompted studies to be done to assess if the group

format was as effective as the previous vehicle of delivery. No significant differences were

observed and hence the group study format was kept until today [21]. The curriculum for adult

EFNEP generally consists of 10-12 lessons that cover health topics such as physical exercise,

food resource management practice, nutrition and food safety [29]. At the beginning of the

program, participants take a survey before intervention, known as the pre-test. At the end of

the program participants are then given the same survey questions, known as the post-test.

The difference in the post and pre-test are considered measures of self-reported behavioral

change and hence effectiveness of the program [29]. The survey is based on 10 questions or

EFNEP behavior checklist questions that can be found in the USDA website.

2.1.2 Literature on Effectiveness of Adult EFNEP

There are two evaluation methods that are used in Adult EFNEP: 1) 24 hour food recall

and 2) Behavior checklist [30]. These evaluation tests are usually given before program

intervention and after program intervention. Various studies have employed these evaluation

methods to assess many aspects of the impacts of adult EFNEP such as cost benefit[11],

effectiveness of lesson delivery mode [31], nutritional knowledge retention[15, 32], factors that

influence maintained behavioral change among graduated participants[33], and minimum

number of EFNEP lessons required to induce desired behavioral change [30]. In 2001, Murphy

PS *et al* [34] conducted a study to evaluate the validity of the 24 hour food recall and Behavior

checklist methods by measuring serum carotenoid levels and determining how participant

responses correlated with the carotenoid levels. The results showed that both evaluation

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methods were valid and a reliable measure of improved behavioral change induced by the nutritional education program EFNEP.

Another study [15] examined long-term effects on food and nutrition behaviors and other benefits of the adult Expanded Food and Nutrition Program (EFNEP) on participants who completed the program. Data collection instruments included the Family Record form and a follow-up open-ended questionnaire to determine additional benefits. The impact of EFNEP on nutrition knowledge and practices and retention of information after graduation was examined on a sample of 59 participants in New York City who were assessed at program entry, graduation, and a 1-year follow-up using behavior checklist evaluation method. For 10 of 12 food practice behaviors, the participants improved significantly between entry and graduation. Data from a 24-hour recall revealed a significant decrease between entry and graduation in the amount and percentage of calories from fat. Between graduation and follow-up, mean protein, calcium, and vitamin A intakes declined but were within acceptable ranges or exceeded National Research Council (NRC) Recommended Dietary Allowance (RDA). The participants also attributed personal and social improvement to EFNEP participation at follow-up including help in their jobs, community participation, and improved family and personal health.

A research study published in 2005 [6] looked into how program management and job attributes can influence behavioral change in EFNEP participants in New York State (NY). Overall the Community Nutrition Educators (CNEs) were questioned on managerial practices, relationships with supervisors and miscellaneous work related activities, such as workload and student numbers. Data were collected from all NY counties leading to total sample size of 30 sites. Survey data included 30 supervisors, 100 CNE's and 6,321 EFNEP participants. Data

collected includes age, gender, ethnicity, wages and years of postsecondary education as well as data from a survey. The survey used a likert type scale. Factor analysis with orthogonal rotation was used to check for survey reliability as well as the Cronbach coefficient. The Cronbach coefficient ranged from 0.71 to 0.92 implying that data was highly reliable. The dependent variable (or desirable outcome) was measured using the adult behavior checklist[1] found in the USDA website. Six out of the ten questions were chosen and converted to a 100 point scale. These six questions were chosen because previous research observed that these six questions clustered together, indicating they measured the same desired behavioral change.

A regression model was used that had a control variable to account for participants with the least potential for change, measured by if they were previously enrolled in the program. Furthermore, some filtering was done to remove independent variables that were weakly associated with behavioral change using partial correlation coefficients. Regression analysis on behavioral change of EFNEP participants using attributes *Potential for change*, *Individual instruction*, *Managerial practices*, and *Perceived value of EFNEP* as explanatory variables showed a strong positive correlation between behavioral change and CNEs who valued EFNEP program. In addition, CNEs with good relations with their supervisors achieved higher behavioral change. Furthermore, six of the twelve managerial practices such as planning, monitoring, and networking were associated with good behavioral change. Finally, increasing CNE's work load and student to teacher ratio were negatively correlated with behavioral change.

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[1] Behavior checklist is a 10 question evaluation instrument released in 1996, used to measure behavior change in adult EFNEP.

2.2 Youth EFNEP Background

The youth EFNEP began in 1971 and the program is comprised of participants between 3 and 19 years of age, similar to the 4-H age range. The youth EFNEP targets youth in low income families, poor neighborhoods, and children participating in programs for limited resource individuals. For example, youth in families that are enrolled in programs like SNAP and WIC could participate in EFNEP [35]. The curriculum used had content that was similar to what was taught in Adult EFNEP with the exception that youth were taught self-efficacy and imbued with knowledge to make independent choices about what they consumed. The Youth EFNEP program used the *Food Guide pyramid*, and then *MyPyramid* for its nutritional curriculum until recently, but the core of the nutritional lessons is now based on *MyPlate*. Lessons can last from a few days to several months. Like the Adult EFNEP program, youth participants are often administered a pre-test and a post-test. These surveys are not identical to the Adult surveys. The surveys are designed such that the English is easy enough for a child, depending on their age, to understand and to elicit an appropriate answer. These surveys usually go through rigorous testing and filtering before they can be used to remove questions that are hard or questions that would otherwise prompt the same response for both pre-test and post-test [17]. The lessons are usually delivered at places such as schools, camps, youth clubs, and after school care [11]. On average for the past five years, there have been at least 400,000 youth are reached by EFNEP every year, at the national level [36].

Although past research has indicated EFNEP to be successful, the success of youth EFNEP may depend on factors such as participant's attributes and instructional attributes or program delivery attributes. Youth participant's attributes include education level, age,

proximity of the EFNEP learning center and language barrier. Program delivery attributes may include instructor's education level, number of students, number of contact hours, and follow up for students who miss classes [6, 17].

2.2.1 Virginia Youth EFNEP

Virginia Youth EFNEP was established in 1971. Currently Virginia Youth EFNEP operates in 21 counties, with program assistant assigned to each county: Appomattox, Lynchburg, Roanoke, Campbell, Goochland, Loudoun, Rockingham, Culpeper, Tazewell, Carroll, Scott, Patrick, Wythe, Wise, Norfolk City, Chesapeake City, Hampton, Richmond City, Charles City, Westmoreland, and King William. In Virginia the organizational structure is such that PAs report to the Area Coordinator. The Area Coordinator reports to both the Extension Food and Nutrition Program (EFNP) project director and the District Director, who finally repots to the Virginia Cooperative Extension (VCE) director (see Appendix A).

2.2.1.1 Virginia Youth EFNEP Core Curriculum: Healthy Weight for Healthy Kids

In 2005, Healthy Weight for Healthy Kids (HWHK), a curriculum used for Youth EFNEP in Virginia was developed by Dr. Elena Serrano and colleagues [37]. The motivation behind the development of the curriculum was based on responses of EFNEP and Supplemental Nutrition Assistance Program – Education (SNAP-Ed), formally known Food Stamp Nutrition Education Program (FSNEP). Specifically, the responses were that the curriculum being used at the time was not tailored to deal with obesity prevention. Hence, HWHK was created based on the Experiential Learning Model [38]. HWHK program targets Youth aged between 7 and 14. The

Curriculum is delivered in six lessons or topics that have activities associated with them in order to achieve targeted experiences. The lessons are:

- **Smart Foods**: Participants learn the foundation of health eating (*MyPlate)*.

- **Smart choices**: Participants learn to think about what they eat by exploring different foods and tastes. The goal of this topic is to enjoy food, while eating healthy.

- **Smart Activities**: Participants are taught about calories and activities that they can do to expend calories. They also learn about inventions and technologies that can limit ones activity.

- **Smart Drinks**: Participants learn to differentiate between nutritious and non-nutritious beverages. They also learn to make healthy soda alternatives.

- **Smart Snacks**: Participants learn to compare snacks through food labels, in order to choose healthy snacks.

- **Smart Image**: Participants learn to positively accept different body sizes and shapes and focus on personality.

2.2.2 Literature on Effectiveness of Youth EFNEP

The trend of USDA's impact assessment for Youth EFNEP between years 2008 and 2011 is as shown below [36]. According to USDA, the impact of EFNEP on youth has declined since 2008, highlighting the importance of knowing factors that may be responsible for this observation. In addition to socio-economic factors, external factors such as interaction between youth and parents in families taking EFNEP may influence program effectiveness. Other external factors that could be responsible for such a trend are economic reasons. For example,

the recession that started in late 2007 could have affected households and created a stressful environment for youth, distracting them from learning in school.

Figure 1 Trends of USDA impact indicators among Youth enrolled in EFNEP[2]
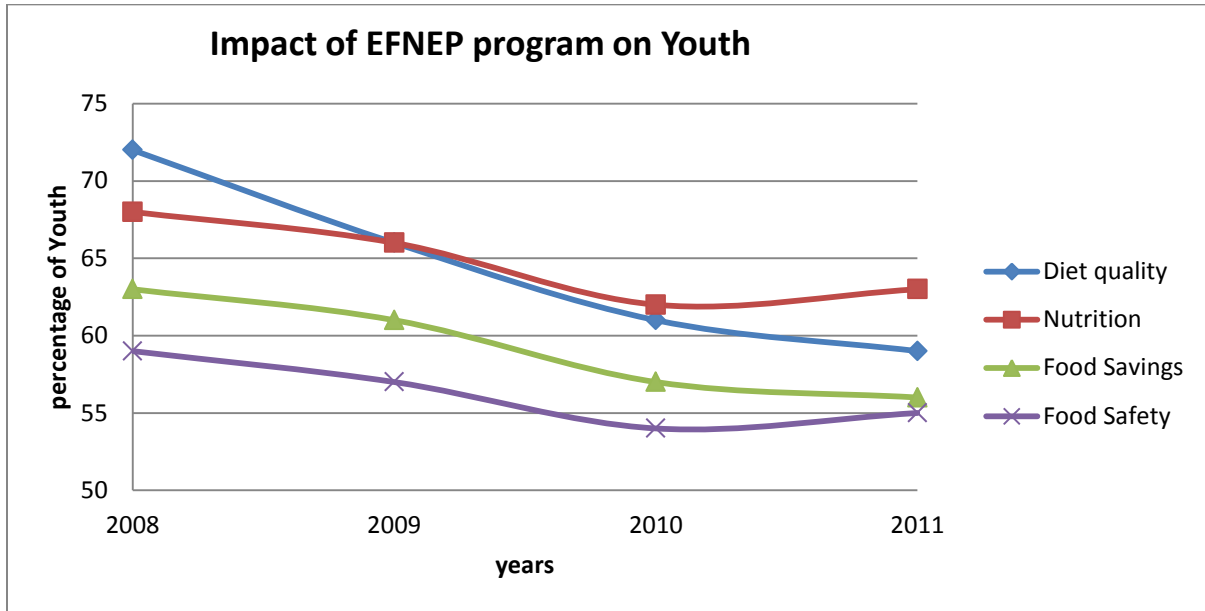
Various studies have evaluated how nutrition education may help youth in making better decisions when it comes to healthy eating and diet. For example, Watson *et al* [39] find that nutrition education significantly impacted attitudes and eating behaviors of youths aged between 14 and 19 years. Another study conducted by Freedman and Nickel [40] also came to the same conclusion. However, retention of nutritional knowledge by youths aged between 9 and 14 years was observed to be poor three months after intervention. Another study by Shilt *et al* demonstrated that nutrition education programs had a positive effect on student academic performance for sixth grade students [41]. Recently an instrument was developed by Branscum *et al* [42] to check consistency and validity of behavior checklists for youth enrolled in

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[2] The graph generated from the Department of Agriculture (USDA) data.

EFNEP. Although, the instrument was determined to be adequately reliable, the authors suggested that more work needed to be done to improve internal reliability of survey data since reliability scores for milk consumption and healthy eating behaviors were low compared to fruit and vegetable consumption.

While some of these research studies were done to assess the effects of nutrition education on youth, only one study has been published that directly deals with effectiveness of youth EFNEP [17] and the factors that affect the program effectiveness. In this study, 10 Youth EFNEP counties in the state of California were evaluated, with a sample size of 5,111 participants. The goal of the study was to determine the effectiveness of Youth EFNEP and to determine if the federal impact indicator method was appropriate for youth EFNEP. The study targeted low income kids aged 9-11. The study was designed to have treatment samples and control samples. Pre-survey questions were gauged multiple times before being given to participants. For example, questions answered correctly at most 20% and at least 80% of the time, were removed. In addition, questions that had the highest variation were removed and p-values of less than 5% for Pearson correlation coefficient were used for reliability. By using ANCOVA in the analysis of data, only three of the four impact indicators were observed to be statistically significant in assessing effectiveness of the program between treatment group and control group.

Chapter 3.0 Instrument Development, Data Collection, and

Econometric Model

This section will summarize the development of the instrument used to investigate the effectiveness of EFNEP on youth enrolled in the HWHK program. In addition, methods used to determine appropriate instrument items or survey questions will be mentioned, as well as filters or cut-offs that were used to remove items that would otherwise elicit an undesired response.

3.1 Development of Instrument to measure Youth EFNEP Effects

In recent years, accountability and evaluation have been the emphasis for federally funded programs. Unlike adult EFNEP, which uses checklist developed by the USDA to evaluate the success of the program, youth EFNEP does not have a standardized instrument for measurement. As a result an instrument was created to measure youth EFNEP effects. An advisory board that contributed advice and helped in the development of an instrument that could be used for Youth EFNEP in Virginia was then compiled. The advisory board was designed also to assure research quality. The advisory board and individual who provided sound input with different perspectives consisted of: Susan Baker: Colorado EFNEP director – Nutrition; Dr. Paul Estabrooks - behavioral science and obesity researcher; Dr. Nancy Franz - extension curriculum development and evaluation; Dr. Kathy Hosig - community nutrition research; Dr. Michael Lambur- evaluation specialist; Dr. Michael Ellerbrock, economist, Dr. Gary Skaggs - Educational Research and Evaluation; Dr. Marylin Townsend - nutrition education research and programs and Mary McFerran. The developed instrument was geared specifically to measure

the effectiveness of youth EFNEP. In Virginia, the instrument was developed for limited resource youth, aged 7-14 years, participating in HWHK.

3.1.1 Selection of instrument background

An extensive review of literature was the first step in instrument development with the objective of identifying valid, reliable, and sensitive instruments on diet and physical activity for limited resource youth. The literature review was conducted through academic search engines using specific words that would apply to the project. The words used were EFNEP, youth, child(ren), adolescents, nutrition education, knowledge, attitudes, skills, behaviors, physical activity, program, programming, instruments, and evaluation. In reviewing the literature of both the EFNEP programs and other youth programs, 15 survey instruments were identified, but only four that were consistently reliable in literature were selected for use in the selection of potential question that can be included in the study. The four potential youth evaluation instruments considered were from Nebraska, California, Wisconsin and Virginia[43-45]. These four instruments were designed for youth EFNEP evaluations. They covered the appropriate age range, and had some information regarding reliability and validity.

However after closer review and consultation with the advisory board these instruments were found deficient for use for three reasons. First, all of the instruments did not have sufficient topic coverage that would correspond to a general nutrition education programs, such as HWHK. Second, the instruments were not sufficiently verified for validity and reliability. Third, the instruments were mainly knowledge focused. The published literature on nutrition education literature has moved toward measuring self-efficacy (SE), behavioral Intention (BI) and behavior (B), rather than simply knowledge. Self-efficacy is the *belief* that a person can

accomplish a particular action [46-48]. Behavioral Intention is a measure of a person's *conviction* on particular action [47-49]. Behavior, on the other hand is the observable course of action under any given circumstance[49]. Given these limitations, the research team and advisory board agreed that developing a new instrument was the best course of action. The resulting topics approved by the advisory board to be covered in the instrument came from the Dietary Guideline for Americans 2005 and were as follows:

- Different food groups from MyPyramid

- Sweetened beverages

- Discretionary calories

- Physical activity

- Portion size

- Sodium intake

Research team members with expertise in nutrition (Drs. Serrano and Hosig) developed initial drafts of 93 questions covering these topics. The 93 questions contained behavioral intention (BI), behavior (B) and self-efficacy (SE) questions. The survey was very long because both positive and negative aspects of the three instruments BI, B and SE were represented in the questions. An example of negative question is: Yesterday I ate fried meat with crust and an example of a positive question is: Yesterday I ate fresh fruit. Given these questions the participants would have to pick the correct answer. For the age range of 7 to 14 years of age, the questions needed to be simplified to the typical instrument for this ages range, based on the four main surveys that were considered.

The survey items were then presented to the board to ensure that the questions were relevant to the goals of EFNEP. In addition, four PA's in Virginia were consulted to assess the validity of the identified questions and to propose suggestions on response categories. The PA's suggested that frequency of food consumption should be used instead of quantity of food. Their reasoning was that it would be more difficult for children to quantify consumed food (e.g., an ounce, a cup) as compared to saying how many times they ate the food item. As a result, the questions were arranged in a likert type scale format to represent items in terms of frequency. Higher scores in questions that represent positive aspect of the instrument correspond to desirable outcome in nutritional behavior, whereas higher scores in questions that represent negative aspect of the instrument correspond to undesirable outcome. For each instrument, 28 of 31 questions had a 4 point type likert scale while 2 questions had a 5 point likert type scale and one question had a 2 point type likert scale.

After a thorough review of the original pool of questions, a new pool of 111 questions that were more appropriate for the project were generated, based on three alternative instruments found in the literature; Healthy Youth Places [50], Gimme5 [51], and the School Physical Activity and Nutrition Questionnaire (SPAN) [14] that were commonly used. A similar format as in the original pool of questions was used. The advisory board was consulted again, and based on the PA's feedback the questions were reduced from 111 to 87. Ambiguous questions as well as questions that could not be put in terms of frequency were removed. Also, two new questions on demographic and food security were added to the bank of questions for each topic, making a total of 93 questions.

3.1.2 Pilot testing

Upon completion of the survey instrument, a pilot testing for this study was implemented over a period of three months from December 2010 to February 2011. The purpose of the pilot study was to further reduce the number of questions to be employed in the study. A typical survey of this type usually will have 30 or less questions. All 93 questions were used in the pilot study. In December of 2010, the test was administered by six youth EFNEP PA's in Virginia on 272 participants. Participants were tested on only two instruments, either behavior (B) and self-efficacy (SE) or behavior intention (BI), to alleviate response load. The behavior instrument was given to all 272 participants while self-efficacy and behavioral intention was each given to 139 and 115 participants respectively. Although the sample sizes are different, the expectation was that differences in sample sizes would not introduce bias.

3.1.3 Statistical procedures for filtering questions

Two types of analysis, item analysis and exploratory factor analysis were used to filter out less effective questions.

Item analysis is a method that measures the performance of questions or items with respect to each instrument, based on responses of participants and how these responses correlate with one another. The underlying assumption in item analysis is that there is a single latent factor the items are trying to measure. Usually the questions that do not correlate well ($r > .30$) with the total test score are removed. In this study it was observed that 11 of the 31 questions for self-efficacy and behavioral intention were significantly correlated with the total test score. However, all these questions were those that selected negative aspect of the instruments. In contrast, the behavioral component had 11 questions that were positive aspect

of the instrument and were significantly correlated with the total test score. This bi-cluster of negative and positive questions per instrument suggests that the items are capturing more than one underlying latent factor. To explore this possibility, exploratory factor analysis (EFA), which helps identify the number of underlying latent factors, was then employed. Moreover, the end goal of the use of EFA was to select those items that are clearly associated with the final instrument.

The method EFA expresses items as a linear combination of factors that are related to each other. In the regression linear equation, the coefficient of the items or factor loadings measure how each item contributes to a factor. Higher coefficients correspond to higher contribution to a factor. Therefore, items with strong correlation to a factor measure the strength of association of a factor to the instrument. This is important since EFA can be used to remove items that correlate with unwanted factors and keep or retain items that correlate with the desired factor or instrument. EFA on pre-test data revealed the presence of two factors for each instrument. The main two factors were for positive and negative aspects of each instrument. However there were few items that had low correlation ($r<.3$) with any of the two factors and these were not considered in this study. In light of these results, factor loadings were then used to select items or questions that would be used in the final instrument. Items with coefficients greater than 0.3 for each factor were chosen to represent each instrument. In addition, the item factor loadings with high correlation across instruments were selected. As a consequence, 48 questions were filtered out to remain with 47 questions.

While the number of items was significantly reduced, 47 were still too many for the 7 to 14 age range of students. Consequently, given the main focus is behavior (B), and self-efficacy

(SE) and behavior intention (BI) are designed to measure similar concepts; BI was dropped out of the instruments in favor of self-efficacy (SE) based on previous published studies. As a result two indicators with 33 items remained and these were the final items used in the survey instrument for youth enrolled in HWHK in Virginia.

3.1.4 Final Participant Survey and Delivery

In addition to the behavior and self-behavior questions, two other sections were added to the instrument to collect information that was thought to be potentially important in terms of changes in scores on the questions. Several questions were added to get basic demographic and other information on the participants or participant attributes. The demographic variables collected were gender, age, ethnicity, and race.

In addition to the participant attribute questions, questions were also included to get an idea about food availability. A student may not score high on a behavioral question, a question about consumption, not because the program was ineffective but simply because they did not have the food at home, so accounting for availability seemed to be important. Examples of food information gathered included availability of grains, milk, beans, and fruits and the frequency with which the participants consumed them. This was accomplished by employment of a likert scale ranging from zero days to seven days. Participants were given the survey before intervention and after intervention. The number of question per section is given in Table B.1, followed by the complete survey instrument for participants (see Appendix C).

3.1.5 Program Assistants: The program assistants had to complete the following forms for every completed youth EFNEP program.

- *Healthy Weight for Healthy Kids handouts log sheet*: This was to collect itemized information on what lessons (of the six HWHK lessons) participants were taught. This information is important as it can be used to gauge what aspects of the lessons are most effective in changing behavior.

- *4H FNP Group Enrollment Form*: This form collects information such as program start and end date, program delivery mode, number of meetings, number of contact hours participant gender and ethnicity, and what grade participants are in at school.

- *Healthy Weight for Healthy Kids Evaluation Cover Sheet:* This sheet provides information on the location of the program, when the program started and if there were any students in that program who had participated in any type of nutrition class before.

This information is also attached in the appendix C

3.2 Geographic sites used in this study: The survey questions were conducted in all the 19 counties that participated in youth EFNEP in the Virginia and only programs initiated between September and December 2011 were used. Some programs were completed the same year while others were completed in 2012. As a result, the study covers ten counties out of the possible 19. These counties providing data for this study are Appomattox, Lynchburg, Carroll County, Scott, Patrick, Charles City, Harrisonburg, Wise, Norfolk City and Westmoreland.

3.3 Data Collection and Storage

In addition to the survey instrument and forms, a copy of all the PA characteristics about their gender, ethnicity, age, and years of experience with youth EFNEP was provided by the PAs area coordinators. Before data entry, surveys for each box were manually matched using the first 10 questions on the survey that help identify participants. This was done to match a post-

test survey with a pretest-survey for each participant. Once the evaluations were matched, the paired surveys were paper clipped together and were ready to be entered. After several meetings on what the best database should be, a Microsoft Access™ database was created to store all the data for participants and PAs. Using only data for participants who started the program in the fall of 2011, a total of 1,158 participants graduated and successfully completed both the pre-test and post-test. However, data used for analysis had a sample size of 1135 merged pre-test and post-test. The reduced sample size was due to data that came late and was not used in the study.

3.4 Econometric Model

The main outcome of interest is whether or not the participants improved in their behavioral score, consequently new variables were created for the pre and post-test responses to indicate if the scores declined (a -1 value), did not change (a 0 value), or increased (a 1 value). This new variable effectively creates three categories and interest is in what factors determine the probability of being in one of these three categories. Given the ordering of these categories, this suggests an ordered probit model will be appropriate. The assumptions [52] being made with the ordered probit model are that:

- The threshold parameters are constant

- Independent variables are exogenous

For HWHK study the model, the latent index function is [53]

$$Y_j = x_j' * \beta + \epsilon_j \quad for \; j = 1 \dots n \qquad (1)$$

where Y_j is the unobservable dependent variable, j is the number of observations, x_j' is a vector of explanatory variables, β is a vector of coefficients and ϵ_j are error terms. Since there are 3 possible outcomes, the observed y_j is defined as

$$y_j = t \quad if \quad \theta_{t-1} \leq Y_j \leq \theta_t \quad for \; t = -1,0,1 \tag{2}$$

Therefore, using equation (1) the conditional probability of observing any of the three categories is:

$$Pr(y_j = t|x_j) = Pr(\theta_{t-1} \leq Y_j \leq \theta_t)$$

$$= Pr(\theta_{t-1} \leq x_j' * \beta + \epsilon_j \leq \theta_t) \tag{3}$$

And this leads to

$$Pr(y_j = t|x_j) = Pr(\theta_{t-1} - x_j' * \beta \leq \epsilon_j \leq \theta_t - x_j' * \beta)$$

or

$$Pr(y_j = t|x_j) = Pr(\epsilon_j \leq \theta_t - x_j' * \beta) - Pr(\epsilon_j \leq \theta_{t-1} - x_j' * \beta) \tag{4}$$

For the conditional probability to be positive θ must be ordered in increasing values. To determine the conditional probabilities, a standard normal distribution is used. Assuming a standard normal distribution for ϵ_j or $\epsilon_j \sim N(0,1)$ equation [1] becomes:

$$Pr(y_j = t|x_j) = \Phi(\theta_t - x_j' * \beta) - \Phi(\theta_{t-1} - x_j' * \beta) \quad [5]$$

Furthermore, use of the maximum likelihood method can be used to estimate θ and β for the model. The statistical software package STATA has a built in algorithm that can estimate an ordered probit model. In addition, the software will also compute the marginal effects of each explanatory variable on the dependent variable and how significant the effects are on changing the targeted outcome, as coefficient estimates are uninformative about changes in the

probabilities. Because there is only interest in the last category (improvements in the behavioral score) only the marginal effect (ME) for that category will be calculated and reported. The ME for the last category is

$$ME_k = \frac{\partial Prob(y = 1|x)}{\partial x_k} = \Phi(\theta - x'_k\beta_k)\beta_k$$

Where k denotes the number of explanatory variables of interest

This formula calculates the change in the probability of an improved score for a one unit change in the x variable. The null hypothesis to be tested is then

$$H_0: ME_k = 0$$

The statistical software package STATA has a built in algorithm that can estimate an ordered probit model. In addition, the software will also compute the marginal effects of each explanatory variable on the dependent variable and how significant the effects are on changing the targeted outcome. A "z" test is used to test the hypothesis. Therefore a $p - value < |z|$ less than 0.05 rejects the null hypothesis.

Chapter 4.0: Data and Summary Statistics

Data inconsistencies were checked between the pre and post survey. A code to get the sample size for each characteristic for both pre-test and post-test was then executed using STATA 11.2. Given that the post-test sample size was generally larger, it was decided that post-test results will be used for participants' attributes for this study. Because PAs attributes were provided by the coordinators, it was not necessary to do a quality check on them. However curriculum attributes were corrected for any blank responses.

4.1 Variables used in Analysis and their definitions

This section describes all the variables that were used in the ordered probit model. This includes dependent variables and explanatory variables: Participants attributes Program Assistant attributes and Curriculum attributes.

4.1.1 Dependent variables

The dependent variables for this study were chosen based on the behavior instrument only. Table 4.1-1 presents the variables used in the analysis. Questions that were chosen include: Whole Grains, Fresh Fruit, Colored Vegetables, MyPlate and Breathe Hard, which are questions 38, 45, 48, 52 & 55 in the survey (see Appendix C). Briefly the five questions were chosen because they were among the items with the largest mean difference and were significantly different from zero (see Appendix B, Table B.2). Responses on Whole Grains, Fresh Fruit and Colored Vegetables were based on a 4 point likert scale, while the MyPlate response was based on a 2 point likert scale. The Breath Hard response was based on a 5 point likert

scale. In addition, as mentioned earlier, the five items align with the USDA dietary recommendation.

Table 4.1-1 Description of Dependent Variables

Variable name	Description of characteristics [Unit]
Whole Grains	Measures if the individual improved in their behavioral score on whole grains question [1 if yes, 0 otherwise]
Fresh Fruit	Measures if the individual improved in their behavioral score on fresh fruit question [1 if yes, 0 otherwise].
Colored Vegetables	Measures if the individual improved in their behavioral score on colored vegetables question [1 if yes, 0 otherwise].
MyPlate	Measures if the individual improved in their behavioral score on MyPlate [1 if yes, 0 otherwise.
Breathe Hard	Measures if the individual improved in their behavioral score on breathe hard question [1 if yes, 0 otherwise].

4.1.2 Explanatory variables

Dummy variables were used to assess how different levels of the respective variable influences program effectiveness. The variables percentage of male in a class or group, percentage of participants from urban areas in a group and weighted percentage of handout were used as continuous variables.

4.1.2.1 Participants' attributes

The variables that were used for EFNEP Youth Participating in HWHK in this study are: male, Age, African American, Non-White Ethnicity, Latino and Reside with Both Parents as presented in table 4.1-2. Male is the dummy variable for gender that has 1 for male and 0 for female. Ethnicity has two dummy variables where African American and Non- white Ethnicity takes the value 1 respectively and 0 if ethnicity is White. Latino is the dummy variable for race

that has 1 if participant is Hispanic and 0 if participant is non-Hispanic. Type of family that participants reside with has a dummy variable Resides with Both Parents.

Table 4.1-2 Variable definitions for variables used in the model

Variable name	Description of characteristics [Unit]
Participants	
Male	Gender of participant [1 = male, 0 = female]
Age	Age of participant [years]
African America	Ethnicity of participant [1 = African American, 0= White]
Non White Ethnicity	Ethnicity of participant [1 = Asian, Pacific Islander and American Indian or other, 0= White]
Latino	Race of participant[1 = Hispanic or latino,0 = Not Hispanic or Latino]
Reside with Both Parents	Type of family that participants live with [1 = both parents, 0 = single parent, grand parents or other]

While gender is not expected to have any effect on program effectiveness, we expect older kids to be able to easily grasp and retain the curriculum information as compared to younger kids, hence the older the kid the more effective the program. Ethnicity (non-white) and race (Latino) may also be an implication on how much of English language a participant understands, in which case these attribute may negatively affect the dependent variable. However, like gender African American is not expected to have any influence in the effectiveness of the program. Type of family are expected to not have any influence on the effectiveness of EFNEP.

4.1.2.2 Program Assistants' attributes

The variables that were used for PA's teaching the HWHK curriculum are: male, Age, African American and dummy variables for years of experience as presented in table 4.1-3. Male, Age, African American are the dummy variables for gender, age and ethnicity respectively.

Table 4.1-3 Program Assistant Variable Description

Program Assistants(PA's)	Description of characteristics [Unit]
Male	Gender of instructors [1= male, 0 = female]
Age	Age of instructors [years]
African American	Instructor's ethnicity [1 = African American, 0 = White]
Years of Experience (>=5 & <10)	At least 5 years but less than 10 years of experience an instructor has with Youth EFNEP [1 if >= 5 & < 10 years of experience, 0 = otherwise]
Years of Experience (>=10)	At least 10 of Experience an instructor has with Youth EFNEP [1 if >= 10 year of experience, 0 = otherwise]

PA gender and race are not expected to have any effects on HWHK program. PAs with more work experience are expected to have positive effects on the HWHK program relative to those PAs with less work experience. Similarly, since age is correlated to experience, older PAs are expected to be more effective than younger PAs at improving health behavior of participants.

4.1.2.3 Program/Curriculum Attributes

Table 4.1-4 presents all the curriculum variables used in the analysis. Dummy variables were created for Program duration, Frequency of Lesson, delivery mode, class size and student to stuff ratio. The variables percentage of males in a class and percentage of participants in a class are continuous variables used to capture the environment of the class in which each participant was attending. In addition HWHK lesson is also a continuous variable that is weighted according to the number of handout used per experience.

Table 4.1-4 Curriculum Variable Description

Curriculum	Description of characteristics [Unit]
Program Duration in Months (> 1.5 & <= 3)	Duration of the program that lasted between 1.5 and at most 3 months [1 if >1.5 & <= 3 months, 0 = otherwise]
Program Duration in Months (>3)	Duration of the program that lasted for more than 3 months s [1 if > 3 months, 0 if <= 3 months]
Days between Lessons	Number of days between lessons [1 if >10 days, 0 if <= 10 days]
Duration of Lesson	Duration of the lesson [1 if > 30 minutes, 0 if <= 30 minutes]
4H delivery	Delivery mode of the program [1 if delivery mode is 4-H Special Interest or After school Program using 4-H Curricula/Stuff training, 0 = if School Enrichment Program]
% of Male in a Class	Percentage of males in a given group/class
Small Class (< 20)	A group with less than or equal to 20 participants[1 if class size < 20 participants, 0 = otherwise]
Large Class (>60)	A group with more than 60 participants[1 if class size > 60 participants, 0 = otherwise]
Student to Staff ratio	Proportion of student to staff in group /class[1 if >= 15, 0 = otherwise]
% of Participants from Urban Areas	Percentage of the number of participants living in suburb areas, with a population of less than 50,000 and participants living in cities, with a population of greater than 50,000
Smart Food	Percentage HWHK handouts for Smart Foods lesson used by instructors to teach the class.
Smart Choice	Percentage HWHK handouts for Smart Choice lesson used by instructors to teach the class.
Smart Activity	Percentage HWHK handouts for Smart Activity used by instructors to teach the class.
Smart Drinks	Percentage HWHK handouts for Smart Drinks used by instructors to teach the class.

Curriculum attributes that are expected to positively impact HWHK effectiveness are longer program duration, smaller class sizes, shorter lessons, smaller student to staff ratio and all the HWHK lessons. The attributes that are expected to have a negative impact on HWHK program

are larger class size, short program duration, larger number of days between lessons, longer lesson duration in terms of minutes, and higher ratios of students to staff. Attributes such as program delivery mode, programs in urban areas and percentage of males in a class are not expected to have any impact on participant behavioral change.

4.2 Summary statistics

Table 4.2-2 summarizes the descriptive statistics of all the variables used for the sample. For explanatory variables, Post test results were used for measuring all the participants' attributes. This decision was reached because post-test had the least number of blank spaces and unknown responses for most attributes. A depiction of percentage of participants' raw data is in Appendix B figure B.2.

4.2.1 Dependent Variable

The focus of this study was only on the positive behavioral score. Participants who took MyPlate lesson had the largest (51%) positive score of the 1052 participants, while Fresh Fruit had the least (35%) number of 1083 participants who showed improvement from pre-test to post-test. Of the 1081 participants, 39% of participants who responded to the Whole Grains item showed improvement. Breathe Hard item had 40% of the 1052 participants who had a positive score. Thirty-six percent of the 1067 participants showed improvement on Colored Vegetable Item (see table 4.2-1).

A paired participant's T-test was computed for each dependent variable, as shown in table B.2 in Appendix B. All the five dependent variables showed a significant positive change or the hypothesis that the means of the differences was greater than zero. While there are some

Table 4.2-1 Summary Statistics of Dependent variables and Independent Variables

Dependent Variables	No of obs	Mean	Std.Dev.	Min	Max
Whole Grains	1081	.39	.49	0	1
Fresh Fruit	1083	.35	.48	0	1
Colored Vegetables	1067	.36	.48	0	1
MyPlate	1011	.51	.50	0	1
Breathe Hard	1052	.40	.49	0	1
Independent Variables					
Participants	No of Obs	Mean	Std.Dev.	Min	Max
Male	1134	0.48	0.50	0	1
Age	1130	9.65	0.86	8	14
African American	1097	0.29	0.45	0	1
Non White Ethnicity	1097	0.21	0.41	0	1
Latino	1122	0.09	0.29	0	1
Reside with Both Parents	1118	0.38	0.49	0	1
Program Assistant					
Male	10	0.10	0.32	0	1
Age	10	46.30	16.79	24	68
African American	10	0.30	0.48	0	1
Years of Experience (>=5 & <10)	10	0.30	0.48	0	1
Years of Experience (>=10)	10	0.10	0.32	0	1
Curriculum					
Program Duration in Months (> 1.5 & <= 3)	59	0.51	0.50	0	1
Program Duration in Months (>3)	59	0.31	0.46	0	1
Days between Lessons	59	0.59	0.50	0	1
Duration of lesson in Minutes	59	0.92	0.28	0	1
4H delivery	57	0.09	0.29	0	1
% of Male in a class	58	0.49	0.08	0.32	0.65
Small class (<30)	1115	0.43	0.50	0	1
Large class (>60)	1115	0.20	0.40	0	1
Student to Staff ratio	905	0.41	0.49	0	1
% of Participants from Urban Areas	58	0.10	0.04	0.02	0.17
Smart Food	1135	19.73	13.55	0	46.67
Smart Choice	1135	22.64	20.39	0	66.67
Smart Activity	1135	7.37	7.74	0	24.88
Smart Drinks	1135	20.06	19.21	0	66.67
Smart Snacks	1135	18.54	16.66	0	50
Smart Image	1135	7.54	9.75	0	25

participants whose healthy behavior seems to have deteriorated, a larger percentage of participants improved behavior. MyPlate had the greatest mean difference of 0.37, while fresh fruit had the least mean difference of 0.13.

4.2.2 Explanatory Variables

4.2.2.1 Participants Attributes

Of the 1134 participants, 48% were male. Fifty percent of the 1097 participants were white and 29% were African American. Only 9% of 1122 participants were Hispanic or Latino. Thirty-eight percent of the 1118 participants lived with both their parents while the rest lived with a single parent, grandparents or other relatives. The average age of participants was 9.65 years. (see table 4.2-1)

4.2.2.2 Program Assistant Attributes

All in all, there were 10 PA's who taught HWHK curriculum in the fall of 2011. Only one PA was African American male and the rest were female. Seventy percent of the PA's were white females. The youngest PA's were 24 years of age while the average age of PA's was 46 years. For the purpose of this research, the PA's years of experience were categorized into three categories; PA's with less than 5 years of experience, PA's with 5 years or more but less than 10 years of experience, PA's with more than 10 years of experience. Thirty percent of the PAs had between 5 and 10 years of experience, ten percent more than 10 years of experience, implying 60 percent had less than 5 years of experience.

4.2.2.3 Curriculum Attributes

Similarly, most of the curriculum attributes were categorized to create dummy variables. A total of 59 groups or classes were taught. A larger proportion of groups (51.%) attended their classes over a period of more than one and a half months but less than three months while 31% attended the program for more than three months. Fifty-nine percent of the groups met once every 11 or more days. The majority (92%) of the groups had lessons that lasted for 60 minutes or 90 minutes. A school enrichment program was the main delivery mode, with 91% of groups delivering the lessons through a school enrichment environment (i.e. 4H is only 9 %).

Number of males and females in the class and the participants' place of residence were based on what the PA's reported. It is from this report that the total number of participants in a class was calculated. Of the documented 58 groups, the average percentage of males in each group was 49%. An average of 10% of the participants in a group was from urban areas. Forty-three percent of the participants sat in small classes or groups of 30 or less. Twenty percent sat in large groups of more than 60 participants. The student to staff ratio was calculated by dividing the group size by the number of volunteers (which excludes PA's). Forty percent of the participants were in groups in with the student to staff ratio of at least 15. All the lessons were used in the study. However 19.73% of handouts on smart foods were used by participants, 22.6% of handouts on smart choices, 7.37% of handouts on smart activities, 20.06% of handouts on smart drinks, 18.54% of handouts on smart snacks and finally 7.54 % of handouts on smart image were used by participants.

Chapter 5.0 Results

5.1 Whole Grains Results

As mentioned in section 3.2.3, the missing observations were from survey questions that had multiple answers and questions that were not answered by either participants or PAs. Some of the variables had missing observations and as a consequence, STATA excluded those samples from the statistical analysis leading to 794 observations used in the model. This means that 27% of the data was dropped in the model. The proportion of values -1, 0, 1 for the raw dependent variable was 25:35:39 while proportion of the modeled sample values was 24:36:40. As mentioned earlier, the coefficient estimates in an ordered probit model do not tell us anything about the marginal effect of the variable on the probability of the outcome, so all the results will be reported in terms of the marginal effect. Furthermore, all marginal effects are evaluated at the mean of the data.

Because many of the explanatory variables are dummy variables, a base category (the omitted category) must be selected. The base participant attribute profile is a female, white American, non-Latino, and does NOT reside with both parents. The base for program assistant attribute profile is female, white American and years of experience less than 5 years. Finally, the base of curriculum attribute profile is program duration less than or equal to 1.5 months, days between lessons, duration of lessons that are at most 30 minutes, school enrichment program delivery mode, medium class of class size of more 20 participants and at least 60 participants and participants to staff ratio of less than 15 students per staff. All marginal effects should be interpreted as relative to these base profiles and, of course, all marginal effects are

subject to the caveat of *ceteris paribus*. Table 5.1 reports the marginal effects of all the attributes on improved Whole Grain Behavior score.

Table 5-1 Marginal Effects of the Attributes on Improved Whole Grain Behavior

Variable Name	Marginal Effect	P Value
Participants Variable names		
~Male	-0.02	0.42
Age	-0.03	0.20
~African American	-0.07	0.04**
~Non White Ethnicity	-0.02	0.71
~Latino	-0.03	0.23
~Reside with Both Parents	0.03	0.40
Program Assistant Attributes		
~Male	-0.04	0.86
Age	0.02	0.03**
~African American	-0.31	0.02**
~Years of Experience (>=5 & <10)	-0.28	0.22
~Years of Experience (>=10)	-0.45	0.00***
Curriculum Attributes		
~Program Duration in Months (> 1.5 & <= 3)	0.00	0.94
~Program Duration in Months (>3)	0.19	0.00***
~days between lessons	-0.06	0.00***
~Duration of lesson in Minutes	0.14	0.00***
~4-H Delivery	0.42	0.08*
% of Male in a class	-0.25	0.21
~Small class	0.06	0.26
~Large class	0.12	0.21
~ Student to Staff ratio	0.14	0.00***
% of Participants from Urban Areas	-0.71	0.38
Smart Food	0.00	0.02**
Smart Choice	-0.00	0.98
Smart Activity	0.02	0.02**
Smart Drinks	-0.004	0.01***
Smart Snacks	0.007	0.35
Smart Image	-0.03	0.11

*** Denotes a 1% significant level, ** denotes 5% significant level, * denotes 10% significant level
(~) dy/dx is for discrete change of dummy variable from 0 to 1

5.1.1 Effects of Participants Attributes

Of the six participant attributes, the marginal effect of students with an African American background is the only attribute that is statistically significant at the 0.05 level. The marginal effect of being African American indicates that the probability of an improvement in the behavior score for whole grain is .07 lower for an African American. It is surprising that in regards to this instrument, for content with whole grains, gender, age and youth residence did not have an impact on the Whole Grain positive behavior score. A check on whether whole grains were available to African Americans did not yield any significant difference from other participants.

5.1.2 Effects of Program Assistant (PA) Attributes

Of the five program assistant (PA) attributes, age, African American, and PA's with 10 or more years of experience are significant at the 0.05 level. An additional year on age of PAs increases the likelihood of improvement on the behavior score by 0.02 at the 0.03 significance level while African American PAs reduce the probability of an improved behavior score by 0.31 at the 0.02 significance level. Finally, PA's with 10 or more years of experience decrease the likelihood of an improved behavior score in whole grains by 0.45 at the less than 0.01 significance level.

5.1.3 Effects of Curriculum Attributes

For curriculum attributes, program duration of at least 3 months, the frequency of lessons per week, duration of lessons in minutes, the ratio of student to staff, and the HWHK lessons; Smart Food, Smart Activities, Smart Drinks, had a statistically significant marginal effect

at the 0.05 level on the probability of improvement in the behavior score for whole grain. Prolonging program duration by more than 3 months increased the probability of an improved behavior score by 0.19 at the less than 0.01 significance level. Classes that had more than 10 days between lessons were associated with a 0.06 decrease in the probability of improving the whole grain behavior score at the less than 0.01 significance level. In contrast, lessons lasting more than 30 minutes increase the probability of improving the whole grain behavior score by 0.14 at the less than 0.01 significance level. A 4-H Delivery mode raised the likelihood of an improved score by 0.42 at the 0.08 significance level. Furthermore, each staff assigned to less than 15 participants increased the score of the Whole Grain outcome by 0.14 at the less than 0.01 significance level. The Smart Food lesson had a positive negligible marginal effect of 3.8×10^{-3} on the probability of an improved score at the 0.02 significance level. In addition, the Smart Drinks lesson had a negligible negative effect on the probability of an improved Whole Grain score at the 0.01 significance level. However, Smart Activity lesson increased the probability of improving the whole grain behavior score by 0.02 at the 0.02 significance level.

5.2 Fresh Fruits Results

In total there were 799 observations used in the Fresh Fruit model, which is a 26% drop of data relative to the raw data of the dependent variable representing the Fresh Fruit instrument item. Additionally, for the dependent variable, the proportions for raw data samples for values -1, 0, 1 were 22:43:35 while for modeled samples the proportions were 21:44:36. Table 5.2 reports marginal effects of all the variables on improved Fresh Fruit Behavior score.

Table 5-2 Marginal Effects of the Attributes on Improved Fresh Behavior

Variable Name	Marginal Effect	P Value
Participants Variable names		
~Male	0.02	0.18
Age	-0.01	0.58
~African American	0.08	0.12
~Non White Ethnicity	-0.002	0.95
~Latino	-0.04	0.31
~Reside with Both Parents	-0.06	0.00***
Program Assistant Attributes		
~Male	0.30	0.17
Age	0.02	0.08*
~African American	-0.28	0.03**
~Years of Experience (>=5 & <10)	-0.46	0.00***
~Years of Experience (>=10)	-0.44	0.00***
Curriculum Attributes		
~Program Duration in Months (> 1.5 & <= 3)	-0.01	0.88
~Program Duration in Months (>3)	0.25	0.00***
~Days between lessons	-0.14	0.02**
~Duration of lesson in Minutes	0.19	0.00***
~4-H Delivery	-0.05	0.86
% of Male in a class	-0.13	0.58
~Small class	-0.01	0.91
~Large class	-0.03	0.84
~ Student to Staff ratio	0.04	0.40
% of Participants from Urban Areas	0.01	0.53
Smart Food	0.01	0.00***
Smart Choice	-0.01	0.00***
Smart Activity	0.03	0.00***
Smart Drinks	-0.004	0.18
Smart Snacks	0.01	0.01***
Smart Image	-0.03	0.05**

*** Denotes a 1% significant level, ** denotes 5% significant level, * denotes 10% significant level
(~) dy/dx is for discrete change of dummy variable from 0 to 1

5.2.1 Effects of Participants Attributes

Similar to the Whole Grain, there was a single participant attribute that was statistically

significant at the 0.05 level. Youths living with both parents would lower the probability of an

improvement in the Fresh Fruit behavior score by 0.06 at the less than 0.01 significance level. Being an African American participant had a positive marginal effect of 0.08 on the probability of improving the fruit behavior score that was statistically significant at the 0.12 level. The rest of the participant attributes did not have marginal effects that were statistically significant at even at the 0.15 level.

5.2.2 Effects of Program Assistant (PA) Attributes

PA age attribute increased the probability of an improved outcome score for Fresh Fruit by 0.02 at the 0.08 significance level. African American PAs also had a negative marginal effect of -0.28 on an improved Fresh Fruit score at the 0.03 significance level. PAs with work experience of at least 5 years but less than 10 years were associated with a reduction of 0.46 in the probability of an improved Fresh Fruit score at the less than 0.01 significance level. Similarly, PAs with work experience of at least 10 years reduced the probability of an improved behavioral change by 0.44 at the less than 0.01 significance level.

5.2.3 Effects of Curriculum Attributes

Of the 16 Curriculum attributes, 8 attributes had marginal effects on the Fresh Fruit model that were significant at the 0.05 level. HWHK Program that lasted for more than 3 months increased the probability of an improved Fresh Fruit score by 0.25 at the less than 0.01 significance level. In contrast, Participants who had at least 10 days between lessons reduced the likelihood of the improved Fresh Fruit score by 0.14 at the 0.02 significance level. On the other hand, lessons that lasted more than 30 minutes, Smart Food lesson, Smart Activity lesson, and Smart Snacks lesson increased the probability of an improved Fresh Fruit score by 0.19, 0.01, 0.03, and 0.01

at the less than 0.01 significance level respectively. The lessons Smart Choice and Smart Image reduced the likelihood of an improved Fresh Fruit score by 0.01 at the less than 0.01 significance level, and by 0.03 at the 0.05 significance level respectively.

5.3 Colored Vegetables Results

To run the ordered probit model, 292 samples were dropped from the raw dependent variable measuring behavioral change with respect to vegetable content on HWHK program. After samples were dropped, the mean of the observations increased from 0.127 to 0.150 while the proportion of values -1, 0, 1 was 24:39:37 for raw data and 24:38:39 for modeled data. Table 5-3 reports marginal effects of all the variables on improved Colored Vegetable Behavior score.

5.3.1 Effects of Participants Attributes

Participant age was the only participant characteristic out of the six that had a statistically significant marginal effect at the 0.05 significance level. Participant age was associated with lowering the probability of an improvement in the Colored Vegetable score by 0.05 at the 0.02 significance level. Participants that were non-African American and non-White lowered the likelihood of a positive Colored Vegetable score by 0.04 at the 0.07 significance level.

5.3.2 Effects of Program Assistant (PA) Attributes

Out of the possible 5 attributes for PAs, male PAs and African American PAs had marginal effects that were significant at the 0.05 level. Male PAs increased the probability of an

Table 5-3 Marginal Effects of the Attributes on Improved Colored Vegetables Behavior

Variable Name	Marginal Effect	P Value
Participants Variable names		
~Male	0.02	0.54
Age	-0.05	0.02**
~African American	0.03	0.63
~Non White Ethnicity	-0.04	0.07*
~Latino	0.05	0.35
~Reside with Both Parents	-0.04	0.34
Program Assistant Attributes		
~Male	0.59	0.00***
Age	-0.0008	0.96
~African American	-0.33	0.02**
~Years of Experience (>=5 & <10)	-0.13	0.68
~Years of Experience (>=10)	0.02	0.96
Curriculum Attributes		
~Program Duration in Months (> 1.5 & <= 3)	0.12	0.02**
~Program Duration in Months (>3)	0.42	0.00***
~Days between lessons	-0.06	0.31
~Duration of lesson in Minutes	0.03	0.54
~4-H Delivery	-0.37	0.10*
% of Male in a class	0.18	0.64
~Small class	0.08	0.30
~Large class	-0.32	0.02**
~ Student to Staff ratio	-0.06	0.13
% of Participants from Urban Areas	-0.01	0.53
Smart Food	0.01	0.00***
Smart Choice	-0.00006	0.98
Smart Activity	-0.01	0.26
Smart Drinks	-0.01	0.03**
Smart Snacks	0.01	0.00***
Smart Image	0.002	0.93

*** Denotes a 1% significant level, ** denotes 5% significant level, * denotes 10% significant level
(~) dy/dx is for discrete change of dummy variable from 0 to 1

improved Colored Vegetable (CV) score by 0.59 at the less than 0.01 significance level. In

contrast, African American PAs reduced the likelihood of an improved CV score by -0.33 at the

0.02 significance level. None of the other 3 PA attributes were statistically significant at the 0.10 level.

5.3.3 Effects of Curriculum Attributes

For curriculum, 6 attributes had statistically significant partial effects (0.05 level) on the dependent variable for Colored Vegetables. Program duration of at least 1.5 months but less than 3 months increased the chance of a positive score for Colored Vegetables by 0.12 at the 0.02 significance level. Furthermore, program duration of more than 3 months increased the probability of an improved CV score by 0.42 at the less than 0.01 significance level. Classes that were large were associated with reducing the likelihood of an improved CV score by 0.32 at the 0.02 significance level. Each of the lessons Smart Food and Smart Snacks increased the probability of an improved CV score by 0.01 at the less than 0.01 significance level. In contrast, the Smart Drinks lesson reduced the likelihood of a positive CV score by 0.01 at the 0.03 significance level. Finally, Program 4H-Delivery reduced the chances of an improved CV score by -0.37 at the 0.10 significance level.

5.4 MyPlate Results

Raw data for the MyPlate model dependent variable had 1011 samples while the modeled variable had 744 samples. Compared to other instruments, MyPlate raw data dependent variable had a mean of 0.368, which is at least 2.5 times higher than the means for other instruments. The percentage increase in the mean of samples after data sampling was 23.10% while the proportions of values -1, 0, 1 changed considerably. For the raw data, proportion of values -1, 0, 1 was 14:34:51 while model samples had the proportion 13:29:58.

This suggests that reduction of the samples has resulted in a much lower proportion of zeros and a higher proportion of ones in the dependent variable. Marginal effects are reported of all the variables on improved MyPlate score are reported Table 5-4 below.

5.4.1 Effects of Participants Attributes

None of the participants attributes had partial effects on the MyPlate score that were statistically significant even at the 0.20 level.

5.4.2 Effects of Program Assistant (PA) Attributes

Of the 6 PA attributes, African American PAs had partial effects that were significant at the 0.05 level. African American PAs reduced the probability of an improved MyPlate score by 0.71 at the less than 0.01 significance level.

5.4.3 Effects of Curriculum Attributes

In contrast to other instruments, MyPlate had two curriculum attributes that were significant at the 0.05 level. Program duration of at least 1.5 months but less than 3 months increased the probability of a positive MyPlate score by 0.22 at the 0.03 level. The Smart Choice lesson had a negligible negative marginal effect of -0.004 on the MyPlate positive score at the 0.03 significance level. The Smart Snacks lesson increased the probability of an improved MyPlate score by 0.01 at the significance level of 0.08. Finally, the Smart Food lesson also had a negligible positive marginal effect of 0.005 on the positive score of MyPlate at the 0.09 significant level.

Table 5-4 Marginal Effects of attributes on Improved MyPlate Behavior

Variable Name	Marginal Effect	P Value
Participants Variable names		
~Male	-0.05	0.37
Age	-0.01	0.69
~African American	0.06	0.28
~Non White Ethnicity	-0.04	0.50
~Latino	0.004	0.92
~Reside with Both Parents	0.04	0.34
Program Assistant Attributes		
~Male	0.12	0.73
Age	0.02	0.42
~African American	-0.71	0.00***
~Years of Experience (>=5 & <10)	-0.24	0.70
~Years of Experience (>=10)	-0.52	0.52
Curriculum Attributes		
~Program Duration in Months (> 1.5 & <= 3)	0.22	0.03**
~Program Duration in Months (>3)	0.18	0.18
~Days between lessons	-0.04	0.44
~Duration of lesson in Minutes	0.04	0.33
~4-H Delivery	0.34	0.37
% of Male in a class	-0.06	0.89
~Small class	-0.02	0.80
~Large class	-0.02	0.96
~Student to staff Ratio	-0.01	0.89
% of Participants from Urban Areas	0.004	0.90
Smart Food	0.005	0.09*
Smart Choice	-0.004	0.03**
Smart Activity	-0.002	0.93
Smart Drinks	-0.005	0.56
Smart Snacks	0.01	0.08*
Smart Image	-0.04	0.38

*** Denotes a 1% significant level, ** denotes 5% significant level, * denotes 10% significant level
(~) dy/dx is for discrete change of dummy variable from 0 to 1

5.5 Breathe Hard Results

The raw data for Breathe Hard (BH) dependent variable had 1052 observations while the model samples were 784. Model samples had a higher mean of 0.170 while raw data samples had a mean of 0.146. Unlike the MyPlate instrument, the proportion of values -1, 0, 1

was similar for the Breathe Hard item. For raw data, the proportions were 25:35:40 while proportions for model samples were 24:35:41. Table 5-5 reports Marginal effects of all the variables on improved MyPlate score.

5.5.1 Effects of Participants Attributes

Of the 6 attributes for participants, only two were statistically significant at the 0.05 level. Being African American increased the probability of a positive score for BH by 0.09 at the 0.02 significance level. In addition, being Latino increased the likelihood of an improved BH score by 0.24 at the less than 0.01 significance level. Male participants reduced the probability of a positive BH score by 0.07 at the 0.10 significance level. As stated before, is would be under the caveat of *ceteris paribus*.

5.5.2 Effects of Program Assistant (PA) Attributes

For program assistants, age, African American, work experience between 5 and 10 years, and work experience of at least 10 years attributes, had marginal effects on a positive BH score at the less than 0.01 significance level. PA Age was associated with lowering the probability of a positive BH score by 0.03. In contrast African American PAs increased the likelihood of an improved BH score by 0.46. Additionally, PAs with work experience between 5 and 10 years and PAs with work experience of at least 10 years in increased the probability of a positive BH score by 0.62 and 0.71 respectively.

Table 5-5 Marginal Effects of the Attributes on Improved Breathe Hard Behavior

Variable Name	Marginal Effect	P Value
Participants Variable names		
~Male	-0.07	0.10*
Age	-0.03	0.28
~African American	0.09	0.02**
~Non White Ethnicity	-0.01	0.82
~Latino	0.24	0.00***
~Reside with Both Parents	-0.02	0.47
Program Assistant Attributes		
~Male	0.21	0.44
Age	-0.03	0.00***
~African American	0.46	0.00***
~Years of Experience (>=5 & <10)	0.62	0.00***
~Years of Experience (>=10)	0.71	0.00***
Curriculum Attributes		
~Program Duration in Months (> 1.5 & <= 3)	0.01	0.83
~Program Duration in Months (>3)	0.19	0.03**
~Days between lessons	-0.10	0.07*
~Duration of lesson in Minutes	0.24	0.00***
~4-H Delivery	-0.50	0.00***
% of Male in a class	-0.16	0.45
~Small class	0.02	0.57
~Large class	-0.42	0.00***
~ Student to staff Ratio	-0.12	0.00***
% of Participants from Urban Areas	-0.02	0.09*
Smart Food	0.01	0.03**
Smart Choice	0.005	0.98
Smart Activity	-0.02	0.04**
Smart Drinks	0.004	0.22
Smart Snacks	-0.003	0.29
Smart Image	0.05	0.00***

*** Denotes a 1% significant level, ** denotes 5% significant level, * denotes 10% significant level
(~) dy/dx is for discrete change of dummy variable from 0 to 1

5.5.3 Effects of Curriculum Attributes

Eight of the 16 Curriculum attributes had marginal effect on the BH score that were significant

at the 0.05 level. HWHK programs that lasted more than 3 months increased the probability of

an improved BH score by 0.19 at the 0.03 significance level. Lessons that lasted longer than 30

minutes were associated with increasing the likelihood of a positive BH score by 0.24 at the less than 0.01 significance level. In contrast, 4H-Delivery lowered the probability of a positive BH score by 0.5 at the less than 0.01 significance level. Large classes were observed to reduce likelihood of an improved BH score by 0.42 at the less than 0.01 significance level. Surprisingly, each staff assigned to less than 15 participants was associated with reducing probability of an improved BH score by 0.12 at the less than 0.01 significance level. The Smart Food lesson increased the probability of an improved BH score by 0.01 at the 0.03 significance level while Smart Image lesson had a higher increase of 0.05 on the probability of a positive BH score at the less than 0.01 significance level. In contrast, the Smart Activity lesson reduced the likelihood of a positive BH score by 0.02 at the 0.04 significance level. Lessons that met on an interval of more than 10 days improved behavioral score by 0.10 at the 0.07 significance level. Participants in urban areas lowered the probability of a positive BH score by 0.02 at the significance level of 0.09.

Chapter 6.0 Discussion and Conclusion

6.1 Discussion

The discussion focuses on comparing consistent results across models by attribute impacts, before turning to conclusions.

For Participants' attributes, there are no consistent patterns observed across the models. There were more negative marginal effects than positive marginal effects on the behavior scores for the five instruments as presented on table 6-1. This is surprising as it suggests that some participants, based on their attributes, are at a disadvantage in the program. Interestingly, the MyPlate behavior score was not affected by participant characteristics. The average MyPlate behavior score was unusually high for the raw data samples. It is possible that the effects of participant explanatory variables are diminished by the high mean of the dependent variable for this instrument. In addition, this result could be due to the effects of sampling as sampling was shown to alter the distribution of samples for this instrument.

For program Assistants, African Americans Program Assistants' were consistently associated with negative marginal effects on positive behavioral scores with the exception of the positive BH behavioral score. There were only two African American PAs used in the data analysis. One was male and the other was female. The male PA did have a positive impact on CV behavioral score and no other marginal effects on other behavioral scores. The other African American PA was 68 years old and taught 362 students. This large number of students may correspond to a higher work load and hence negatively impact program effectiveness.

Table 6-1 Summary of direction of marginal effects of program attributes

Variable Name	Whole Grain	Fresh Fruit	Colored Vegetable	MyPlate	Breathe Hard
Participants Variable names					
~Male					
Age			-		
~African American	-				+
~Non White Ethnicity					
~Latino					+
~Reside with Both Parents		-			
Program Assistant Attributes					
~ Male			+		
Age	+				-
~African American	-	-	-	-	+
~Years of Experience (>=5 & <10)		-			+
~Years of Experience (>=10)	-	-			+
Curriculum Attributes					
~Program Duration in Months (> 1.5&<= 3)			+	+	
~Program Duration in Months (>3)	+	+	+		+
~Days between lessons	-	-			
~ Duration of in Minutes	+	+			+
~Delivery Mode					-
% of Male in a class					
~Small class					
~ Large class			-		-
~ Staff to Student Ratio	+				+
% of Participants from Urban Areas					
Smart Food	+	+	+		+
Smart Choice		-		-	
Smart Activity	+	+			-
Smart Drinks	-		-		
Smart Snacks		+	+		
Smart Image		-			+

(~) dy/dx is for discrete change of dummy variable from 0 to 1

Other PA attributes were not consistently associated with any behavioral models but were heterogeneous in terms of their marginal effects on the positive behavioral scores.

For the curriculum, attributes had more positive marginal effects than negative marginal effects across all the five behavioral scores as shown on table 6-1. Attributes that were consistently associated with having a positive marginal effect on behavioral scores were program duration, smart foods lesson, and lesson duration. Shorter programs may not give students enough time to put into practice the material they learnt from class. The Smart Food lesson had a positive effect on all the four instruments. The content for this lesson focused on fruits, vegetables, MyPlate, and different food groups. The observation that this lesson was effective could be due to the activities or experiences that youth may have liked. Another reason could have been that the lessons were easier to comprehend than other lessons. Finally, another reason could be that the content itself is more relevant than content for other lessons. Other HWHK lessons were not consistent in either a positive or negative direction.

6.2: Conclusion

Although Youth EFNEP has been implemented since early 1970s, research on Youth EFNEP has been hampered by lack of a standard instrument or instruments that can assess the effectiveness of the program at promoting or inducing positive behavioral change among youth. Current literature has been focusing on how effective nutritional programs are for federal sponsored youth programs like SNAP and EFNEP. A Paradigm shift on determining factors that influence effectiveness of youth nutritional program EFNEP was initiated by Townsend and colleagues in 2006[17]. Four years later in 2010, Branscum *et al* published a study on the applicability of a modified behavioral instrument for use on Youth[42]. Their

instrument was a success. In the same spirit, we developed an instrument consisting of 55 survey questions for Virginia Youth EFNEP, integrated with Healthy Weight for Healthy Kids lessons, to enable researchers to assess various aspects of the Youth EFNEP program such as program effectiveness. This study is the first to use the instrument to determine what factors influence how effective the HWHK was at inducing positive behavioral change among youth participants. As opposed to the four federal impact indicators used to evaluate program effectiveness, our study focused on the behavioral component only, using five items each of which is a metric that indicates different levels of behavioral response among youth participants. In addition to their large mean differences, these five items were chosen based on the CDC dietary guidelines and also on previous research. Because the behavior scores of the five items were categorical, an ordered probit model was used to identify attributes of the program that increased the probability of the program to promote positive behavioral change.

The results of the ordered probit model showed that participant gender, age, ethnicity, Latino, and residence of youths were factors on the effectiveness of the program. While three of the four instruments showed lower probability scores in improved behavioral outcome for participant attributes, the BH instrument measuring levels of physical exertion showed an increase in the likelihood of an improved score for African American and Latino participants.

All the PAs attributes were also factors on HWHK program effectiveness. Older PAs were more effective on Whole Grains and Fresh Fruits than younger PAs on increasing the probability of a positive behavioral response among participants. These results suggest that older PAs could be assigned to deliver lessons focusing on Whole Grains and Fresh Fruits while younger PAs could focus on physical activities. Additionally, PAs with work experience of more than 5

years were less effective than PAs with work experience less than 5 years in improving the behavioral scores for Whole Grains and Fresh Fruits. Strangely, the PAs that had negative marginal effects on scores for Whole Grains and Fresh Fruits had positive marginal effects on the BH. These observations suggest that PA attributes could be used to enhance HWHK program in the future. For example, Male PAs could focus on vegetable lessons while PAs with extensive work experience of more than 5 years could focus on lessons focusing on physical exercise.

The attributes that did not show any significant effects on any of the instruments were percentage of males in class and small class size. There were only two attributes that exhibited positive effectiveness on all the four instruments. These were Program duration of at least 3 months and the HWHK Smart Food lesson. Increasing program duration has costs associated with it. Since lessons lasting less than 30 minutes were less effective than lessons lasting more than 30 minutes, lessons could be made longer while keeping program duration shorter to lower costs while increasing program effectiveness. However, the interval between lessons should be kept less than ten days since 10 or lessons with intervals more than 10 days were observed to be less effective than the alternative. Class size should be reduced to less than 60 students while each staff volunteer should be assigned to no more than 15 students to enhance HWHK program. The HWHK delivery mode school enrichment programs should be used more since these programs were more effective than their counterparts in 2 of the instruments. Content for Smart Drinks and Smart Choice lessons could be changed to make them more effective in increasing the likelihood of improved behavioral response from participants. The effects Smart Activity, Smart Snacks and Smart Image lessons were heterogeneous on the

likelihood of increasing the positive scores for all the four instruments. Content that is lacking for each instrument in the lessons could be added to determine if this would make the effects on the likelihood of improved outcome more homogenous.

For future studies, curriculum content could be analyzed to determine why curriculum effects on program effectiveness are heterogeneous. Since studies in Linguistics and Phonology have linked words and word-sounds to learning in children [54], different words and word sounds could be compared between the content of Smart Food to contents of the five HWHK lessons to determine if there are any statistical significant differences using a hyper-geometric test [55] that can explain why Smart Food is more effective than other lessons. Because most youth participants depend on their parents, a study that includes parents' characteristics would perhaps yield more accurate results. In addition, interactions terms such as parents and youth can also be included. Another Study that can be done is to determine whether the order in which the HWHK lessons were taken by students influences program effectiveness. Finally a similar study can be done to evaluate factors influencing cost effectiveness of the youth EFNEP program.

As with previous researches, this study has some limitations. As shown by Krueger using the "causal map" model[56], participant behavioral change also depends on internal factors such as instructor and external factors such as food price and recession that could not be represented in survey. Other problems that have risen with using survey data are the metrics themselves used to measure behavioral change. The questions are usually qualitative in nature and try to capture habits by quantifying the qualitative answers by assigning some numeral digit to each response. As a consequence, each measure is not appropriately normalized across

all indicators and has bias. Even though youths participants' behavior may also depend on their parents choices, the parents' attributes are not known in this study. Another limitation is that Pas can teach without using hand out, hence the results may be biased.

In conclusion, this study has evaluated the usefulness of the developed instrument by identifying factors that affect the effectiveness of Youth EFNEP participants enrolled in the HWHK program in Virginia.
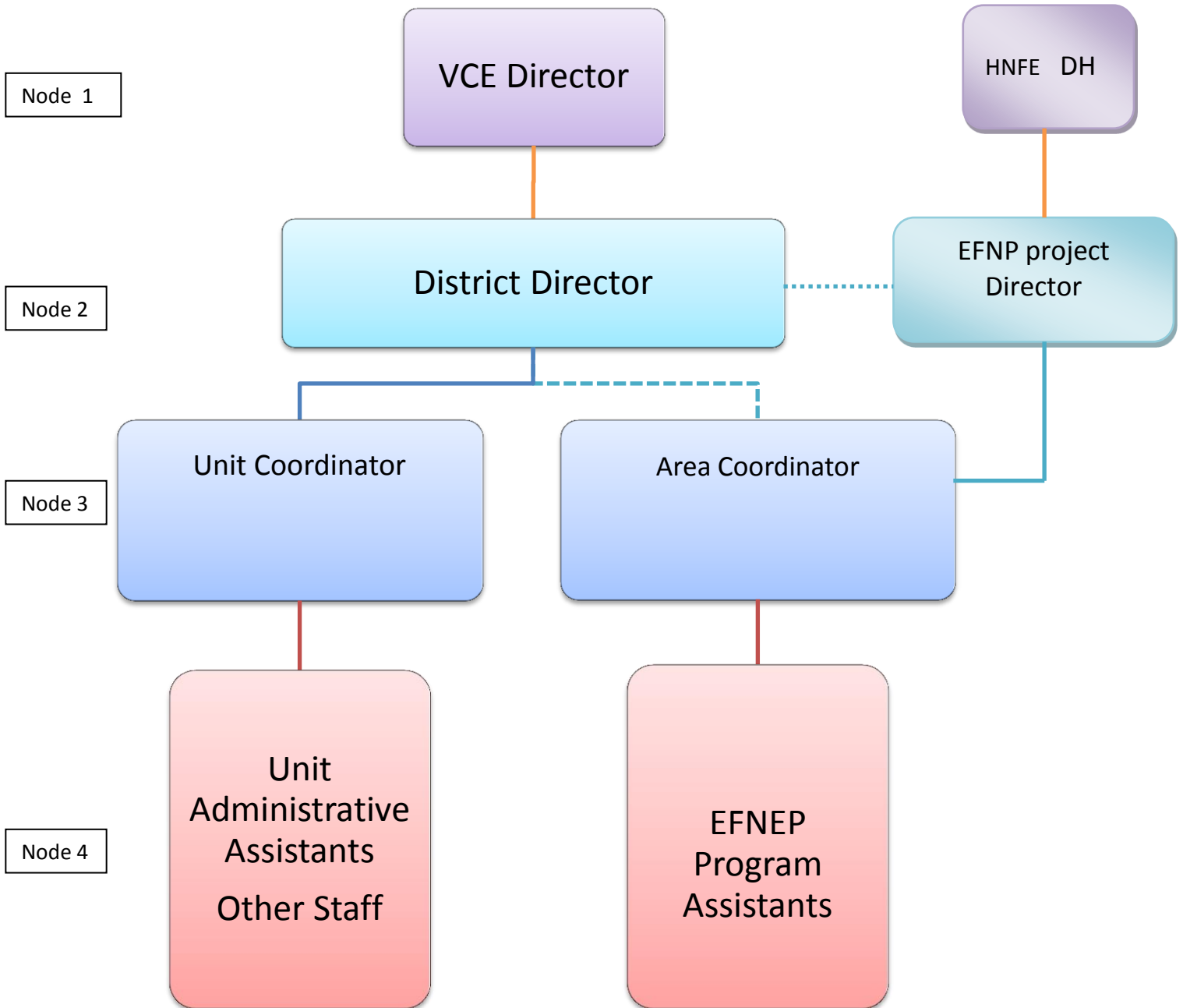
References

1. Sturm, R., J.S. Ringel, and T. Andreyeva, *Increasing Obesity Rates And Disability Trends.* Health Affairs, 2004. **23**(2): p. 199-205.
2. Sassi, F., *Obesity and the economics of prevention: fit not fat.* OECD Publishing, Paris, 2010.
3. Hajat, A., et al., *Do the wealthy have a health advantage? Cardiovascular disease risk factors and wealth.* Social Science and Medicine, 2010. **71**(11): p. 1935-1942.
4. Hunter, P., *Wealth and health.* EMBO Rep, 2009. **10**(8): p. 820-822.
5. Ewing, R., et al., *Relationship Between Urban Sprawl and Physical Activity, Obesity, and Morbidity Urban Ecology*, J.M. Marzluff, et al., Editors. 2008, Springer US. p. 567-582.
6. Dickin, K.L., J.S. Dollahite, and J.-P. Habicht, *Nutrition Behavior Change among EFNEP Participants Is Higher at Sites That Are Well Managed and Whose Front-Line Nutrition Educators Value the Program.* The Journal of Nutrition, 2005. **135**(9): p. 2199-2205.
7. Dean, S., *Economic Decision-making in Poverty Depletes Behavioral Control.* The B.E. Journal of Economic Analysis & Policy, 2011. **11**(1).
8. Martikainen, P. and T. Valkonen, *Do Education and Income Buffer the Effects of Death of Spouse on Mortality?* Epidemiology, 1998. **9**(5): p. 530-534.
9. Yen, S.T., *The effects of SNAP and WIC programs on nutrient intakes of children.* Food Policy, 2010. **35**(6): p. 576-583.
10. McCurdy, K. and E. Metallinos-Katsaras, *Sociodemographic Determinants of Food Security Status Among First-Time WIC Participants.* Topics in Clinical Nutrition, 2011. **26**(3): p. 216-228 10.1097/TIN.0b013e3182260d4e.
11. Burney, J. and B. Haughton, *EFNEP: A nutrition education program that demonstrates cost-benefit.* Journal of the American Dietetic Association, 2002. **102**(1): p. 39-45.
12. Townsend, M.S., et al., *Selecting Items for a Food Behavior Checklist for a Limited-Resource Audience.* Journal of nutrition education and behavior, 2003. **35**(2): p. 69-82.
13. Chirikos, T.N. and G. Nestel, *Further Evidence on the Economic Effects of Poor Health.* The Review of Economics and Statistics, 1985. **67**(1): p. 61-69.
14. Thiagarajah, K., et al., *Validating the Food Behavior Questions from the Elementary School SPAN Questionnaire.* Journal of Nutrition Education and Behavior, 2008. **40**(5): p. 305-310.
15. Arnold, C.G. and J. Sobal, *Food Practices and Nutrition Knowledge after Graduation from the Expanded Food and Nutrition Education Program (EFNEP).* Journal of nutrition education, 2000. **32**(3): p. 130-138.
16. Dollahite, J., *Outcomes of individual vs. group instruction in EFNEP.* Journal of extension, 2003. **41**(2).
17. Townsend, M.S., et al., *Evaluation of a USDA Nutrition Education Program for Low-income Youth.* Journal of nutrition education and behavior, 2006. **38**(1): p. 30-41.
18. Rajgopal, R., et al., *Cost-Benefit Analysis Indicates the Positive Economic Benefits of theExpanded Food and Nutrition Education Program Related to Chronic Disease Prevention.* Journal of nutrition education and behavior, 2002. **34**(1): p. 26.
19. Dollahite, J.e.a., *An Economic Evaluation of the Expanded Food and Nutrition Education Program.* Journal of Nutrition Education and Behavior, 2008. **40**(3): p. 134.
20. Contento, I.R., J.S. Randell, and C.E. Basch, *Review and Analysis of Evaluation Measures Used in Nutrition Education Intervention Research.* Journal of Nutrition Education and Behavior, 2002. **34**(1): p. 2-25.
21. *U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans.* 7th Edition, Washington, DC: U.S. Government Printing Office, 2010.

22.   Hu, F.B., *Plant-based foods and prevention of cardiovascular disease: an overview.* The American Journal of Clinical Nutrition, 2003. **78**(3): p. 544S-551S.

23.   He, F.J., C.A. Nowson, and G.A. MacGregor, *Fruit and vegetable consumption and stroke: meta-analysis of cohort studies.* The Lancet. **367**(9507): p. 320-326.

24.   Fung Tt, C.S.E.M.M.L.R.K.M.L.G.H.F.B., *ADherence to a dash-style diet and risk of coronary heart disease and stroke in women.* Archives of Internal Medicine, 2008. **168**(7): p. 713-720.

25.   Montonen, J., et al., *Dietary Antioxidant Intake and Risk of Type 2 Diabetes.* Diabetes Care, 2004. **27**(7): p. 1845-1846.

26.   Tohill, B.C., et al., *What Epidemiologic Studies Tell Us about the Relationship between Fruit and Vegetable Consumption and Body Weight.* Nutrition Reviews, 2004. **62**(10): p. 365-374.

27.   Rolls, B.J., J.A. Ello-Martin, and B.C. Tohill, *What Can Intervention Studies Tell Us about the Relationship between Fruit and Vegetable Consumption and Weight Management?* Nutrition Reviews, 2004. **62**(1): p. 1-17.

28.   Dollahite J, P.M., *Outcomes of individual vs group instruction in EFNEP.* Journal of Extension, 2003. **41**(2).

29.   Dollahite, J., D. Kenkel, and C.S. Thompson, *An Economic Evaluation of the Expanded Food and Nutrition Education Program.* Journal of nutrition education and behavior, 2008. **40**(3): p. 134-143.

30.   Elizabeth, C., *The number of lessons needed to maximize behavior change among Community Nutrition Education Program (CNEP) participants [M.S. dissertation].* Oklahoma State University, 2008. Dissertations & Theses. Accessed August 19, 2012   Publication Number: AAT 1453226., 2008.

31.   Cox, R.H., A.H. White, and C.K. Gaylord, *A video lesson series is effective in changing the dietary intakes and food-related behaviors of low-income homemakers.* Journal of the American Dietetic Association, 2003. **103**(11): p. 1488-1493.

32.   Brink, M.S. and J. Sobal, *Retention of nutrition knowledge and practices among adult EFNEP participants.* Journal of nutrition education, 1994. **26**(2): p. 74-78.

33.   Torisky, D.M., et al., *Virginia EFNEP homemakers' dietary improvement and relation to selected family factors.* Journal of nutrition education, 1989. **21**(6): p. 249-258.

34.   Murphy, S.P., et al., *Evaluation of Validity of Items for a Food Behavior Checklist.* Journal of the American Dietetic Association, 2001. **101**(7): p. 751-761.

35.   Speirs, K.E., et al., *Grandmothers' Involvement in Preschool-Aged Children's Consumption of Fruits and Vegetables.* ICAN: Infant, Child, & Adolescent Nutrition, 2009. **1**(6): p. 332-337.

36.   USDA. *Expanded Food and Nutrition Education Program Impacts*.   July 2012]; Available from: http://www.nifa.usda.gov/nea/food/efnep/impacts.html.

37.   *Virginia Cooperative Extension*.   August   23,   2012];   Available   from: http://www.ext.vt.edu/news/solutions/solutions2007/articles/HealthyWeightsForHealthyKids.html.

38.   Enns, C.Z., *Integrating Separate and Connected Knowing: The Experiential Learning Model.* Teaching of Psychology, 1993. **20**(1): p. 7-13.

39.   Watson, L.C., et al., *Evaluation of the Nutrition Knowledge, Attitudes, and Food Consumption Behaviors of High School Students Before and After Completion of a Nutrition Course.* Family and Consumer Sciences Research Journal, 2009. **37**(4): p. 523-534.

40.   Freedman, M.R. and A. Nickell, *Impact of After-school Nutrition Workshops in a Public Library Setting.* Journal of Nutrition Education and Behavior, 2010. **42**(3): p. 192-196.

41.   Shilts, M.K., et al., *Pilot Study: EatFit Impacts Sixth Graders' Academic Performance on Achievement of Mathematics and English Education Standards.* Journal of Nutrition Education and Behavior, 2009. **41**(2): p. 127-131.

42.   Branscum, P., et al., *An Evaluation of the Validity and Reliability of a Food Behavior Checklist Modified for Children.* Journal of Nutrition Education and Behavior, 2010. **42**(5): p. 349-352.

43.   *Viginia Cooperative Extension*.   may 1, 2009 September, 2009]; Available from: http://pubs.ext.vt.edu/490/490-403/490-403.html.

44.   *Cooperative Extension Wisconsin Nutrition Education Program*.   September 2009]; Available from: http://www.uwex.edu/ces/wnep/ncyouth/.

45.   *California Agriculture*.   September, 2009]; Available from: http://ucanr.org/repository/cao/landingpage.cfm?article=ca.v060n04p185&fulltext=yes#.

46.   Seher, C.L., *Efficacy of Game On! The Ultimate Wellness Challenge in Increasing Nutrition Knowledge Among Elementary School Children*. 2008, University of Akron.

47.   Glanz, K., *Health Behavior and Health Education : Theory, Research, and Practice*. 2002: Jossey-Bass.

48.   Ajzen, I., *The theory of planned behavior.* Organizational Behavior and Human Decision Processes, 1991. **50**(2): p. 179-211.

49.   Godin, G. and G. Kok, *The Theory of Planned Behavior: A Review of Its Applications to Health-related Behaviors.* American Journal of Health Promotion, 1996. **11**(2): p. 87-98.

50.   Dzewaltowski, D.A., et al., *Healthy Youth Places: A Randomized Controlled Trial to Determine the Effectiveness of Facilitating Adult and Youth Leaders to Promote Physical Activity and Fruit and Vegetable Consumption in Middle Schools.* Health Education & Behavior, 2009. **36**(3): p. 583-600.

51.   Baranowski, T., et al., *Gimme 5 Fruit, Juice, and Vegetables for Fun and Health: Outcome Evaluation.* Health Education & Behavior, 2000. **27**(1): p. 96-111.

52.   Pudney, S. and M. Shields, *Gender, race, pay and promotion in the British nursing profession: estimation of a generalized ordered probit model.* Journal of Applied Econometrics, 2000. **15**(4): p. 367-399.

53.   Greene, W.H. and D.A. Hensher, *Modeling Ordered Choices: A Primer*. 2010: Cambridge University Press.

54.   Gathercole, S.E., et al., *Phonological memory and vocabulary development during the early school years: A longitudinal study.* Developmental Psychology, 1992. **28**(5): p. 887-898.

55.   Exton, H., *Multiple hypergeometric functions and applications*. 1976: E. Horwood.

56.   Krueger, R.A., *EFNEP Computer Simulation: Dust Off Old Files.* Journal of extension, 1980. **18**(4).

Appendix A

Organizational Structure of Virginia Cooperative Extension

Node 1

VCE Director

HNFE   DH

Node 2

District Director

EFNP project Director

Node 3

Unit Coordinator

Area Coordinator

Node 4

Unit Administrative Assistants

Other Staff

EFNEP Program Assistants

Appendix B

Summary Tables and Figures

Table B-1 Organization of Survey for EFNEP Youth on HWHK

Questions	Number of questions
Participant Attributes	11
Availability	8
Self-Efficacy	17
Behavior	21
Total	57

Table B-2 Paired Participant t-test

			P-Values		
Questions	n	Mean Difference	Mean(Diff)<0	Mean(Diff) != 0	Mean(Diff)>0
whole grains	1081	0.14	1.0000	0.0000	0.0000
fresh fruit	1083	0.13	1.0000	0.0000	0.0000
colored vegetables	1067	0.13	1.0000	0.0000	0.0000
MyPlate	1011	0.37	1.0000	0.0000	0.0000
breathe hard	1052	0.15	1.0000	0.0000	0.0000

Figure B.2 Summary of data for participants
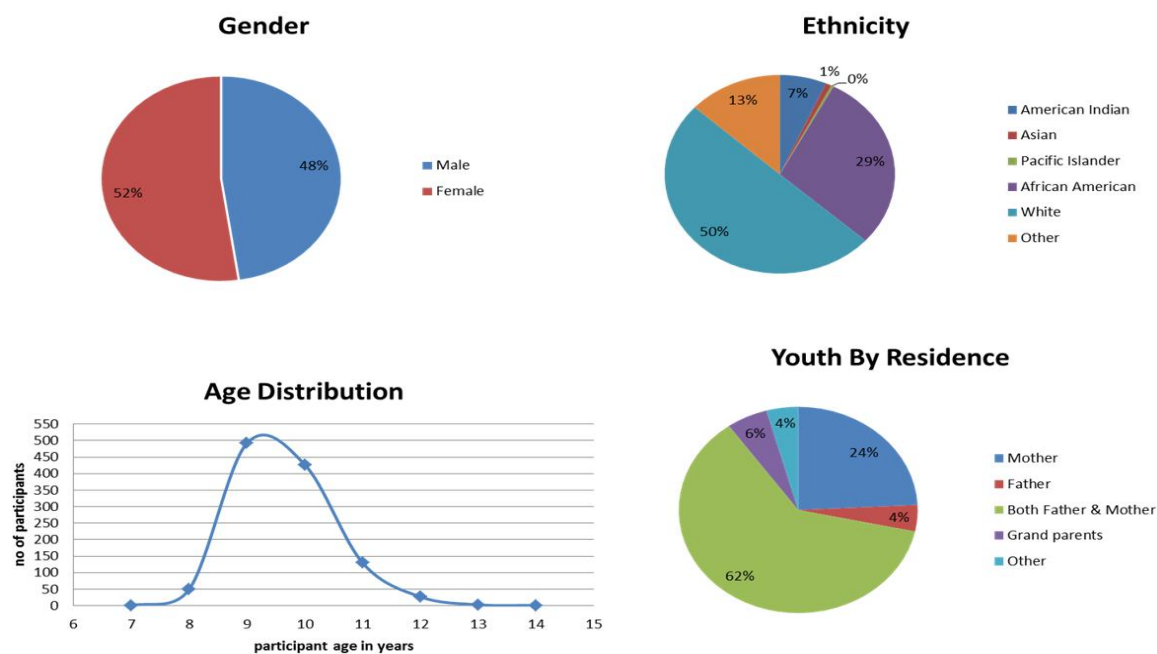
Appendix C

Participants' Survey Instrument and Instructional Forms

Participants' Survey Instrument

Please circle your answer to the following questions:

Questions	Response					
7 **How do you describe yourself?**	American Indian/ Alaskan Native	Asian	Pacific Islander	African American	White	Other
8 **Are you Hispanic or Latino?**	Yes			No		
9 **What language do you use with your parents most of the time?**	English	Spanish	Vietnamese	Chinese	Other	
10 **Who do you live with?**	Mother	Father	Both mother and father	Grand parents	Other	
11 **What grades do you usually get in school?**	Mostly A's	Mostly B's	Mostly C's	Mostly D's	Mostly F's or E's	

2

Section 2: What foods and drinks can you find at home?

Below are some questions about foods and drinks you had in your home last week. This is <u>not a question about eating</u>, but just about *if* they were in your home. Please circle how many days last week the food or drink was in your home. **Circle just one.**

	Questions	How many days a week?								
12	Last week, we had **food made with whole grains** like whole wheat breads, cereals, brown rice, in our home _____ days a week	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days	I don't know
13	Last week, we had **meat or kidney beans, or black beans, or brown beans, or red beans,** in our home_____ days a week	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days	I don't know
14	Last week, we had **milk and milk products** like yogurt, cheese, in our home_____ days a week	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days	I don't know
15	Last week, we had **fruit** like apple, oranges, cantaloupe, grapes, pears, in our home_____ days a week	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days	I don't know

3

	Questions	How many days a week?								
16	Last week, we had **vegetables** like broccoli, green beans, spinach, corn, tomatoes, carrots, in our home_____ days a week	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days	I don't know
17	Last week, we had **beverages** like Coke,™ Gatorade,™ fruit drinks, Snapple,™ in our home_____ days a week	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days	I don't know
18	Last week, we had **desserts** like cookies, cake, candy or pies, in our home_____ days a week	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days	I don't know
19	Last week, I had the chance to be **physically active at home** _____ days a week	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days	I don't know

4

SELF-EFFICACY

Section 3: What do you THINK you can eat?

We want to ask you some questions about your *confidence* in eating different foods or drinking different beverages each day. We are *not* asking what you *actually* eat or drink or what you *should* eat or drink. This is not a test. There are no right or wrong answers. So, please be as honest as possible. Please read the 2 examples below:

	Example Questions	Times Per Day			
A.	**Each day, I think I can** eat a banana… I think I can eat a banana at breakfast, one for an afternoon snack, and one after dinner. So, that is a total of three times. I circle 3 or more.	0	1	2	3 or more
B.	**Each day, I think I can** eat carrots… I do not think I can eat any carrots. I circle 0.	0	1	2	3 or more

Please respond just like the examples above, by circling ONE number for each question.

	Questions	Times Per Day			
20	**Each day, I think I can** eat breads, grains and cereals….	0	1	2	3 or more
21	**Each day, I think I can** eat whole grains… Whole grains include whole wheat breads, oatmeal, cornmeal (cornbread), brown rice, and popcorn.	0	1	2	3 or more

5

Questions	Times Per Day			
22 **Each day, I think I can** eat kidney beans, or black beans, or brown beans, or red beans… Do not include green beans.	0	1	2	3 or more
23 **Each day, I think I can** drink milk… Include milk substitutes like soy milk, almond milk, and rice milk.	0	1	2	3 or more
24 **Each day, I think I can** drink fat-free or low fat milk… Include milk substitutes. Consider any flavor, smoothies, coffee drinks, and other beverages. Low fat milk is 1% and fat-free is skim milk or 0% milk, and they usually have green tops.	0	1	2	3 or more
25 **Each day, I think I can** drink whole milk… Include milk substitutes. Consider any flavor, smoothies, coffee drinks, and other beverages. Reduced fat is 2%, and usually has blue tops. Whole milk usually has red tops.	0	1	2	3 or more
26 **Each day, I think I can** eat fruit… Fruit includes pieces of fresh fruit, dried fruit, or 100% fruit juice.	0	1	2	3 or more

6

	Questions	Times Per Day			
27	**Each day, I think I can** eat *fresh* fruit…	0	1	2	3 or more
28	**Each day, I think I can** eat vegetables…	0	1	2	3 or more
29	**Each day, I think I can** eat vegetables that were orange, red, yellow, or green…	0	1	2	3 or more
30	**Each day, I think I can** eat baked foods instead of fried foods… Baked foods include chicken without skin and pretzels.	0	1	2	3 or more
31	**Each day, I think I can** drink regular soda… Regular soda includes Coca Cola,™ Pepsi,™ and Mountain Dew.™	0	1	2	3 or more
32	**Each day, I think I can** drink water…	0	1	2	3 or more

7

	Yes or No?		
33	I know what to eat for **MyPlate**...	Yes	No
	How much do you agree with this statement?		
34	**Each day, I think I can** eat meals and snacks according to **MyPlate**	Strongly Disagree Disagree Agree Strongly Agree		

Section 4: How physically active do you THINK you can be?

Below are statements about how active you think you can be. Please circle ONE category for each question. Be sure to read the question and response closely.

	Question	Hours Per Day				
35	**Each day, I think I can** be physically active for _____ hours. Physically active includes running, jumping, and dancing.	0	½	1	1 ½	2 or more
	Question	Days Per Week				
36	**Each week, how many days do you think you can** breathe hard for 30 minutes or more while physically active?	0	1	2	3	4 or more

8

BEHAVIOR
Section 5: What did YOU Eat or Drink Yesterday?

In this section, we want to ask you some questions about what you **actually** eat and drink – *NOT* what you *should* eat or drink or *think* you can eat or drink. There are no right or wrong answers. Please be as honest as possible.

	Example Questions	Times Per Day			
C.	Yesterday, I ate a banana… Yesterday, I ate a banana at breakfast, at lunch, for an afternoon snack, and at dinner. So, that is a total of four times. I circle 3 or more.	0	1	2	3 or more
D.	Yesterday, I ate carrots… Yesterday, I did not eat any carrots. I circle 0.	0	1	2	3 or more

Please respond just like the examples above, by circling ONE number for each question.

	Questions	Times Per Day			
37	Yesterday, I ate **breads, grains and cereals….**	0	1	2	3 or more
38	Yesterday, I ate **whole grains…** Whole grains include whole wheat breads, oatmeal, cornmeal (cornbread), brown rice, and popcorn.	0	1	2	3 or more

9

	Questions	Times Per Day			
39	Yesterday, I ate **meat...**	0	1	2	3 or more
40	Yesterday, I ate **hamburger meat, hot dogs, sausage (chorizo), steak, bacon, bologna, or ribs...**	0	1	2	3 or more
41	Yesterday, I drank **milk**... Include milk substitutes like soy milk, almond milk, and rice milk.	0	1	2	3 or more
42	Yesterday, I drank **fat-free or low fat milk...** Include milk substitutes. Consider any flavor, smoothies, coffee drinks, and other beverages. Low fat milk is 1% and fat-free is skim milk or 0% milk, and they usually have green tops.	0	1	2	3 or more
43	Yesterday, I drank **whole milk...** Include milk substitutes. Consider any flavor, smoothies, coffee drinks, and other beverages. Reduced fat is 2%, and usually has blue tops. Whole milk usually has red tops.	0	1	2	3 or more
44	Yesterday, I ate **fruit...** Fruit includes pieces of fresh fruit, dried fruit, or 100% fruit juice.	0	1	2	3 or more

10

	Questions	Times Per Day			
45	Yesterday, I ate *fresh* **fruit...**	0	1	2	3 or more
46	Yesterday, I ate *canned* **fruit in syrup...**	0	1	2	3 or more
47	Yesterday, I ate **vegetables...**	0	1	2	3 or more
48	Yesterday, I ate **vegetables that were orange, red, yellow, or green...**	0	1	2	3 or more
49	Yesterday, I ate **baked foods instead of fried foods...** Baked foods include chicken without skin and pretzels.	0	1	2	3 or more
50	Yesterday, I drank **regular soda...** Regular soda includes Coca Cola,™ Pepsi,™ and Mountain Dew.™	0	1	2	3 or more
51	Yesterday, I drank **water...**	0	1	2	3 or more
	How much do you agree with this statement?				
52	Yesterday, **I ate** meals and snacks according to **MyPlate**	Strongly Disagree	Disagree	Agree	Strongly Agree

Section 6: How physically active are YOU?

Below are statements about how active you are. Please circle ONE category for each question. Be sure to read the question and response closely.

	Question	Hours Per Day			
53.1	Yesterday, were you **physically active?**	Yes		No	
If yes, please answer question 53.2. *If No,* go to question 54.1.					
53.2	Yesterday, I was **physically active for _____ hours.** Physically active includes running, jumping, and dancing.	½	1	1 ½	2 or more
54.1	Yesterday, did you **watch TV, play video games, or use the computer?**	Yes		No	
If yes, please answer question 54.2. *If No,* go to question 55.					
54.2	Yesterday, I **watched TV, played video games, or used the computer** for _____ hours.	1	2	3 or more	

	Question	Days Per Week				
55	Last week, how many days did you **breathe hard for 30 minutes or more** while physically active?	0	1	2	3	4 or more

THANK YOU!

12

Healthy Weight for Healthy Kids Log Sheet

<table>
<tr>
<td colspan="5">Healthy Weights For Healthy Kids Handouts
Log Sheet</td>
</tr>
<tr>
<td>Lesson</td>
<td>Name</td>
<td>Handouts</td>
<td>How many pages were printed out?</td>
<td>What additional resources/ purchases did you use? (food, supplies, printed resources, other materials)</td>
</tr>
<tr>
<td>Smart Foods</td>
<td>Planning a Healthy Plate</td>
<td>❖ MyPlate
❖ Choose MyPlate 10 Tips to a Great Plate
❖ My Plate Coloring Sheet</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nutrient Navigation</td>
<td>❖ MyPlate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Color Your Plate</td>
<td>❖ MyPlate coloring page</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>❖ Fruits and Vegetables by Color Category</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>❖ Kid Friendly Veggies and Fruits</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>❖ Food models</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>❖ Pictures of foods from different food groups representing different colors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>❖ There's a rainbow on my plate</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>❖ Can you Name these Worldly Fruits and Vegetables?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>❖ Tips for parents and families
▪ Add more vegetables to your day
▪ Focus on fruits
▪ Smart shopping for veggies and fruits</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other:</td>
<td>❖ Write here</td>
<td></td>
<td></td>
</tr>
</table>

	Other:	❖ Write here		
Smart Choices	MyPlate Practice	❖ MyPlate		
		❖ Build a Healthy Meal		
	Mindless Eating	❖ Build a Healthy Meal		
	Tongue-tastic	❖ Tongue-tastic		
	Other:	❖ Write here		
	Other:	❖ Write here		
Smart Activities	Activity Charades	❖ Kids Activity Plate		
		❖ Move It!		
		❖ Move It! Diary		
		❖ Add It Up		
		❖ Calorie Chemistry		
		❖ Play Everyday Anyway		
	Silly Songs	❖ Kids Activity Plate		
		❖ Jump Rope Rhymes		
		❖ Move It!		
		❖ Move It! Diary		
		❖ Add It Up		

	❖ *Calorie Chemistry*		
Activitudes	❖ *Kids Activity Plate*		
	❖ *Move it!*		
	❖ *Move it! Diary*		
	❖ *Add it Up*		
	❖ *Calorie Chemistry*		
	❖ *Warm Up Activities*		
	❖ *Power Up Activities*		
Calorie Countdown	❖ *Add It Up*		
	❖ *Calorie Chemistry*		
	❖ *Kids Activity Plate*		
	❖ *Move It! Plate*		
	❖ *Move It! Diary*		
	❖ *Possible: Action Kid's Activity Analysis*		
	❖ *Warm Up Activities*		
	❖ *Power Up Activities*		
Labor-saving Devices	❖ *Move it!*		
	❖ *Kids Activity Plate*		
Other:	❖ *Write here*		
Other:	❖ *Write here*		

Smart Drinks	**Be a Drink Detective**	❖ *Be a Drink Detective*		
		❖ *Nutrient Scavenger Hunt*		
	Filter Buster	❖ *Be a Drink Detective*		
	Mix It Up	❖ *Be a Drink Detective*		
	Other:	❖ *Write here*		
	Other:	❖ *Write here*		
Smart Snacks	**Label Literacy**	❖ *Label Literacy*		
		❖ *MyPlate*		
	Grazing on Grains	❖ *MyPlate*		
		❖ *Choose half your grains whole*		
		❖ *Label Literacy*		
	Sandwich Something	❖ *Label Literacy*		
	Commercializing Ourselves			
	Other	❖ *Write here*		
	Other	❖ *Write here*		

Smart Image	Body Positive	❖ Looking at Looks		
		❖ How do you see yourself?		
	What's Normal Supposed to Look Like Anyway	❖ Are you normal?		
		❖ Looking at Looks		
		❖ Who am I?		
	You Can't Judge a Book	❖ Looking at Looks		
		❖ Who am I?		
	What's important is Inside	❖ Looking at Looks		
		❖ Who am I?		
	Other	❖ Write here		
	Other	❖ Write here		

4H FNP Group Enrollment Form

Virginia Cooperative Extension

4-H EFNEP/SCNEP
GROUP ENROLLMENT FORM
Virginia Expanded Food & Nutrition Education Program/
Smart Choices Nutrition Education Program

REVISED 2006	PUBLICATION 360-093

*Please complete **unshaded** area only. Complete **only** items 2 – 14 if you plan to enter youth individually.*

1.Group ID: _____   2.Unit/Group Name: _____

3. Unit Delivery Mode (circle one):

A-Organized Club   C-Overnight Camps   E-Individual learning, mentoring, or family learning
B-Special interest, short-term programs,   (resident, primitive, or travel)   F- School Age Child Care and Day Camps
D-School Enrichment Programs   G-Instructional TV/Video

4. Street Address: _____

5. City: _____ 6. State: _____ 7. ZIP Code: _____

8. Telephone: (_____) _____ 9. Program Start Date: ___/___/___ 10. End Date: ___/___/___

Staff ID's: 11. Leaders (First and Last Names):

a. _____   _____ (Technician)   c. _____   _____

b. _____   _____ (Primary Leader) d. _____   _____

National Initiative: _____A_____   12. Number of Meetings: _____   13. Contact Hours? _____

14. Number of Youth in Other 4-H groups and activities this reporting year: _____

The remainder of this form should be left blank, if you plan to enter the group members individually.

15. Number of females and males by ethnic/racial background.

Ethnicity Group:	Number of Females	Number of Males
a Hispanic or Latino		
b Not Hispanic or Not Latino		
Race(s):		
c American Indian or Alaskan Native		
d Asian		
e Black or African American		
f Native Hawaiian or other Pacific Islander		
g White		
h other		

16. Number of Youth by Age (years)

____ Under 4	____ 11
____ 4	____ 12
____ 5	____ 13
____ 6	____ 14
____ 7	____ 15
____ 8	____ 16
____ 9	____ 17
____ 10	____ 18
	____ 19

17. Number of Youth by place or residence:
____ 1. Farm
____ 2. Towns with population under 10,000 and rural non-farm
____ 3. Towns and cities with population over 10,000 – 49,999 and their suburbs
____ 4. Suburbs of cities with population over 50,000
____ 5. Central cities with population over 50,000

18. Total Members in Group: _____

19. Name and telephone number of person completing this form:

(First & Last Name) _____ Telephone: (_____)_____

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

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Produced by Agriculture and Extension Communications, Virginia Tech

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VT/638/0206/W/360093

VIRGINIA STATE UNIVERSITY

4-H EFNEP/SCNEP ENROLLMENT

Name of 4-H Club or Group _____
Leader/Teacher _____
Community of School _____
This is page _____ of _____ pages of this group
Check one:
☐ EFNEP Group Project #55318   ☐ SCNEP Group Project #55319

FOR OFFICE USE ONLY

UNIT ☐☐ CLUB ☐☐☐ TYPE ☐ COMMUNITY STATUS ☐

See coding instructions for this section

Names (Listed Alphabetically) Last, First Middle	Address RFD and Box or Street (Including numbers)	City or Town	ZIP	RES	SEX	RACE	Birthday MO	Birthday DAY	Birthday YR	GRADE	4-H Yr	DUPL	4-H Projects/ Subjects 1	2	3	TEEN LDR	LEADER ROLE	LEADER ASSN
LEADERS																		
1.																		
2.																		
3.																		
MEMBERS																		
1.																		
2.																		
3.																		
4.																		
5.																		
6.																		
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21.																		
22.																		
23.																		
24.																		
25.																		

79

HEALTHY WEIGHTS FOR HEALTHY KIDS EVALUATION

COVER SHEET

Name of Program Assistant: _____

Contact information:

    Office location (City/County):_____

    Phone number: _____

    Fax: _____

    Email: _____

School Name: _____

Date Pre-test Administered: _____

Date Post-test Administered: _____

    Please ask the students these 2 questions before starting HWHK Curriculum

By a show of hands:

Q 1. How many students have participated in any type of nutrition class/ mypyramid program before? _____

Q2. How many students participated in any type of nutrition class/ mypyramid program last year? _____

Comments/Notes:

Please return this cover sheet with the group enrollment form and pre- and post-tests for each group to Elena Serrano. Please contact her with any questions, as well. Thank you!

<div align="center">

Elena Serrano, PhD
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201 Wallace Annex
Department of Human Nutrition, Foods, & Exercise
Virginia Tech
Blacksburg, VA 24061-0430
Phone: 540-231-3464
Email: serrano@vt.edu

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